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MONTEREY, CALIFORNIA

THESIS

**AN ANALYSIS OF THE EFFECT OF COMMISSIONING
SOURCES ON THE RETENTION AND PROMOTION OF
SURFACE WARFARE OFFICERS (SWOs) IN THE U.S.
NAVY**

by

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March 2011

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**AN ANALYSIS OF THE EFFECT OF COMMISSIONING SOURCE ON THE
RETENTION AND PROMOTION OF SURFACE WARFARE OFFICERS
(SWO) IN THE U.S. NAVY**

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ABSTRACT

This thesis investigates the effect of commissioning programs on career progression for Navy surface warfare officers (SWOs). This study specifies and estimates three multivariate regression models to analyze the relationship between commissioning source and officer performance using retention and promotion to O-4 as performance measures. As a measure of retention, we used retention after expiration of the initial minimum service requirement. The data was acquired from Officer Master File (OMF) via the Navy Econometric Modeling (NEM) online data system. The file contained 10,295 observations. All observations were surface warfare officers who were before the promotion board between fiscal years 1994 through 2004. The data contained information about demographics, professional and educational background, and separation and promotion information for officers.

The analysis of all three multivariate regression models indicates that commissioning source is a significant determinant of retention and promotion for the SWO community. Contrary to the initial assumption, while OCS graduates have the highest probability of staying in the SW community, USNA graduates have the lowest probability. Although USNA graduates were initially expected to have higher promotion rates, the results suggest that they are less likely to promote to the grade of O-4 than officers commissioned through the NROTC-contract program. However, USNA graduates have a higher probability of promotion than officers from OCS, the NROTC-scholarship program, and from “other sources.”

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LIST OF ACRONYMS AND ABBREVIATIONS

ACDUTRA	Active Duty for Training
ACT	American College Testing
AECF	Aviation Enlisted Commissioning Program
AT	Annual Training
AT/FP	Anti Terrorism/Force Protection
AZ	Above Zone
BOOST	Broadened Opportunity for Officer Selection and Training
CA	California
CCR	Cumulative Continuation Rate
CEA	Combat Exclusion Act
CECECP	Civil-Engineer Corps Enlisted Commissioning Program
CNA	Center for Naval Analysis
CO	Commanding Officer
CSRB	Critical Skills Retention Bonus
DH	Department Head
DIVO	Division Officer
DoD	Department of Defense
ECP	Enlisted Commissioning Program
ECP	Enlisted Commissioning Program
EOOW	Engineering Officer of the Watch
FITREPS	Fitness Reports
FL	Florida

GAO	Government Accountability Office
GCT	General Classification Test
GPA	Grade Point Average
GSA	Global War on Terrorism Support Assignments
HI	Hawaii
I-ACDUTRA	Initial Active Duty for Training
IA	Individual Augmentation
IZ	In Zone
JPME	Joint Professional Military Education
LCDR	Lieutenant Commanders
MCCOC	Marine Corps Commissioned Officer Accession Career
MCP	Meritorious Commissioning Program
MECEP	Marine Corps Enlisted Commissioning Program
MLDC	Military Leadership Diversity Commission
MLE	Maximum Likelihood Estimation
MPA	Main propulsion assistant
MSC/MPF	Military Sealift Command / Maritime Prepositioning Force
MSR	Minimum Service Requirement
NECP	Nuclear Enlisted Commissioning Program
NEM	Navy Econometric Modeling
NEM	Navy Econometric Modeling
NESEP	Navy Enlisted Scientific Education
NFO	Naval Flight Officer
NPRST	Navy Personnel, Research, Studies, and Technology

NROTC	Fleet Accession to Naval Reserve-Officer Training Corps
NROTC	Naval Reserve Officers Training Corps
OAR	Officer Aptitude Rating
OCC	Officer Candidate Course
OCS	Officer Candidate School
OJT	On the Job Training
OLS	Ordinary Least Square
OMF	Officer Master File
OOD	Officer of the Deck
OOD U/W	Officer of the Deck Underway
OSR	Officer Summary Record
PG	Post Graduate
PI	Performance Index
PI	Pacific Islander
PLC	Platoon Leader Course
PM	Probit Model
PSR	Performance Summary Record
ROTC	Reserve Officers Training Corps
ROTC-C	Reserve Officers Training Corps Contract
SAT	Scholastic Aptitude Test
SEAL	Sea-Air-Land Team
SELRES	Selected Reserves
SERB	Selective Early Retirement Boards
STA	Seaman to Admiral

STA-21	Seaman to Admiral-21
SW	Surface Warfare
SW	Surface Warfare
SWO	Surface Warfare Officers
SWOCP	Surface Warfare Officer Continuation Pay
SWOCSRB	Surface Warfare Officer Critical Skills Retention Bonus
SWOS	SWO school
SWOSDOC	SWO division-officer school
TAO	Tactical Action Officer
TAR	Training and Administration of the Reserves
TBS	The Basic School
U.S.	United States
URL	Unrestricted Line
USC	United States Constitution
USNA	United States Naval Academy
VA	Virginia
WA	Washington
XO	Executive Officer
XO-SM	Executive Officer, Special Mission
YCS	Years of Commissioned Service

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I. INTRODUCTION

The strength of an army is measured by the value of its officers and its commanders.

— Mustafa Kemal Atatürk

A. BACKGROUND

Throughout history, officers have been the most important personnel of the armed forces for all nations. The overall quality of military is highly dependent on the quality of its officers. Armed forces want to recruit and retain the best individuals for its officer corps (Korkmaz, 2005). Attracting and keeping valuable personnel has been a great difficulty for every military. The U.S. Navy annually consumes a great amount of money to educate and train candidates for commissioning as officers. The United States Naval Academy (USNA), Naval Reserve Officers Training Corps (NROTC), Officer Candidate School (OCS), and enlisted-to-officer commissioning programs are major commissioning sources of surface warfare officers (SWOs) (Korkmaz, 2005).

Each of these commissioning sources has a different role in officer production. When comparing these sources, it should be taken into consideration that their different roles provide advantages and disadvantages. USNA provides a constant and reliable flow of well-trained officers to the Navy; however, these officers cost more than those from other commissioning sources because of their long and intensive training. Ideally, upon completing a difficult four-year physical and educational course load, individuals graduating from the Naval Academy will have higher willingness to stay in the Navy for long-term careers (Korkmaz, 2005). NROTC provides officers with the freedom to choose their college or university, yet still graduate as a commissioned officer in the United States Navy. NROTC is less costly than USNA, but cannot match the quality of military training. After graduation, OCS provides officers with a short, rigorous training program designed to move them quickly to the fleet. The flexibility of the OCS program enables the Navy to increase officer production quickly, especially during periods of national emergency (CNA, 2008). Ultimately, each of these commissioning sources plays a different, but vital role in the nation's defense.

A comparison of commissioning sources is helpful in determining the most effective method for obtaining and retaining officers. Since recruiting and training of officers requires money, experience, and resources, retaining high-performing officers for longer periods in the Navy is of great importance. Therefore, if one commissioning source has greater success in retention and promotion, the accession of officers from this source should be increased.

Of course, such a policy change would have to depend on a rigorous cost-benefit analysis. A conflict may be faced when the source has both the highest levels of retention and highest cost to recruit and train. In reality, there is both a budget for officer accessions and an approved number of officers required at each rank to maintain force structure. This study focuses specifically on the effects of the various commissioning sources on the retention and promotion of officers.

B. PURPOSE OF THE STUDY

The purpose of this thesis is to analyze the effects of commissioning sources on the career progression of surface warfare officers in the U.S. Navy. The study will measure the determinants of retention and promotion and will enable decision makers to trade off retention and commissioning costs. The study will renew the results of prior studies and facilitate comparisons among commissioning programs. Decision makers will have information with which to conduct cost-benefit analyses of commissioning sources and decide the optimal mix for SWOs. Furthermore, decision makers can investigate why the various sources have different retention and promotion rates and improve the commissioning sources.

C. RESEARCH QUESTIONS

- Does the commissioning source have any effect on retention at the end of initial obligated service?
- Is there a difference in the rate of promotion to the grade of O-4 among SWOs from the different commissioning sources?

D. SCOPE, LIMITATIONS AND ASSUMPTIONS

The thesis includes an overview of commissioning sources and the promotion system for SWOs in the U.S. Navy. Officers who stay beyond their initial obligated service and those who stay long enough to promote to the grade of O-4 will be the focus of this study. The study will construct two models: one for retention after minimum service requirement (MSR) and one for promotion to the grade of O-4. The original data set used in the analysis was taken from the Navy econometric modeling (NEM) system and includes SWOs commissioned between 1994 and 2004. The scope of the study includes an analysis of retention and promotion decisions, an interpretation of the statistical results, and recommendations for decision makers.

The thesis does not conduct a cost-benefit analysis to estimate the marginal cost of commissioning an officer from each source; nor does it control for other performance measures such as fitness reports and evaluation reports, as they are not available in the data set. Therefore, findings may not be sufficient to determine the optimal mix of officer accessions from the various commissioning sources. However, this research does provide policymakers with useful information about the retention and promotion tendencies of SWOs.

The research assumes a significant relationship between commissioning sources and officer performance. Differences in partial effects of commissioning sources on performance are also expected. Since USNA provides longer military training and acculturation, academy graduates are expected to stay longer.

E. OUTLINE OF THE STUDY

This thesis consists of five chapters. Chapter II provides relevant literature about the area of concern. This section includes useful information about commissioning sources, career development, retention issues, and the promotion system for SWOs. It also reviews relevant past studies. Chapter III introduces the data, presents a preliminary analysis of the variables, and discusses the methodology of the study. Chapter IV covers the results of the multivariate analysis of retention and promotion models. Chapter V summarizes the study. In this section, the significance of the results is discussed and

compared with results of previous studies. We discuss the significance of the results and compare them with prior studies. This chapter also includes recommendations for further research.

II. BACKGROUND AND LITERATURE REVIEW

A. OVERVIEW

According to Denmond et al. (2007), surface warfare (SW) is the Navy community that has the missions of naval presence, sea control, and projection of power ashore by use of surface ships. Surface warfare is the oldest community in the Navy and today has just over 8,000 officers. Surface warfare officers are responsible for operating surface ships at sea, including managing onboard systems and personnel. They are the “ship drivers” of the fleet. The peak point of a SWO’s career path would typically be to command a ship at sea. Officers who desire to promote to higher leadership positions must pass through a variety of challenging career milestones, which train and prepare them for such critical commanding responsibilities (Denmond et al. 2007).



Figure 1. Surface Warfare Officer Breast Insignia

This chapter focuses on commissioning programs, career development, and the retention and promotion of SWOs. The first section discusses the commissioning sources, which consist of the United States Naval Academy (USNA), Navy Reserve Officer Training Corps (NROTC), Officer Candidate School (OCS) and enlisted-to-officer commissioning programs. The second section covers the career path of SWOs to include critical retention points. The third section reviews current retention issues among SWOs, including factors that influence retention. The fourth section highlights SWO promotion zones and timing, board process, and promotion as a measure of performance. The fifth section discusses relevant prior studies, and the chapter concludes with a summary.

B. SURFACE WARFARE OFFICER COMMISSIONING PROGRAMS

There are various ways to become a commissioned officer in the United States Navy. A college degree is required for commissioning. An officer's commission is an appointment by the president of the United States. This can be seen as a contract between the individual and his country to perform military duties. There are two types of commission: regular and reserve. A regular commissioned officer commits to serve in the military full time. A reserve commission may be full time or part time. Every officer graduating from one of the commissioning sources receives a reserve commission. With the approval of a new law in September 30, 1996, an officer can earn a regular commission only after completing at least one year of active-duty service. (Thirtle, 2001)

In order to become an officer, an individual may join or consider one of the four commissioning sources:

1. The United States Naval Academy (USNA)
2. The Navy Reserve Officer Training Corps (NROTC)
3. Officer Candidate School (OCS)
4. Enlisted-to-officer commissioning programs

The following two figures exhibit accession rates for unrestricted line (URL) and SWO communities by commissioning programs. Figure 2 shows that NROTC is the main source of officers by providing 40% on average. USNA is second with about 30%, OCS provides an average of 20%, and the enlisted-to-officer programs are last, at 10%.

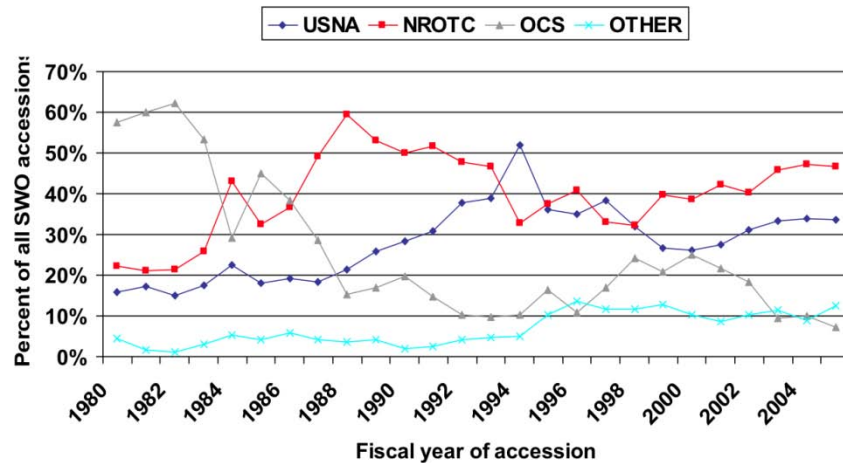


Figure 2. SWO Accessions (From: CNA, 2008)

Figure 3 shows that OCS provides the largest portion of URL officers by an 45% average accession rate. NROTC is second, with a 30% accession rate, while USNA is last, with a 25% average accession rate.

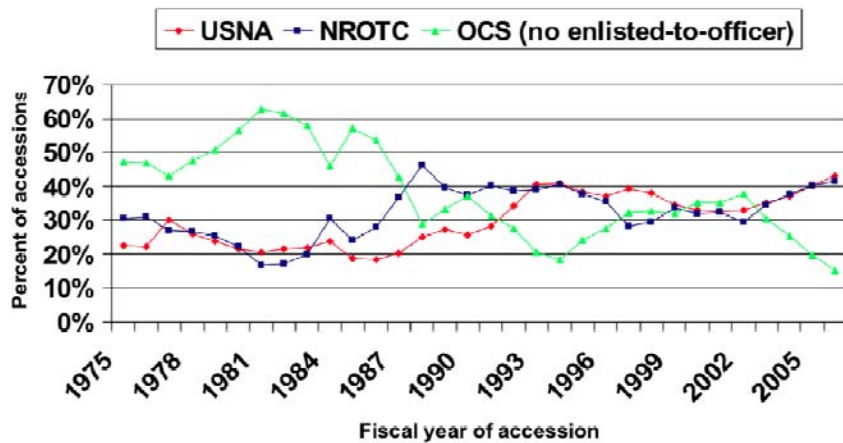


Figure 3. URL Officer Accessions (From: CNA, 2008)

Today, regardless of the commissioning source, the main qualification to become an officer is a college degree. Advances in technology require most officers to have a strong background in science and engineering. Figure 4 exhibits the typical routes for becoming an officer in the military. This figure shows the diverse choices available to

individuals. Background and personal characteristics affect the decision of individuals on the path to commissioning. The following sections describe each commissioning source, including mission, training period, and history.

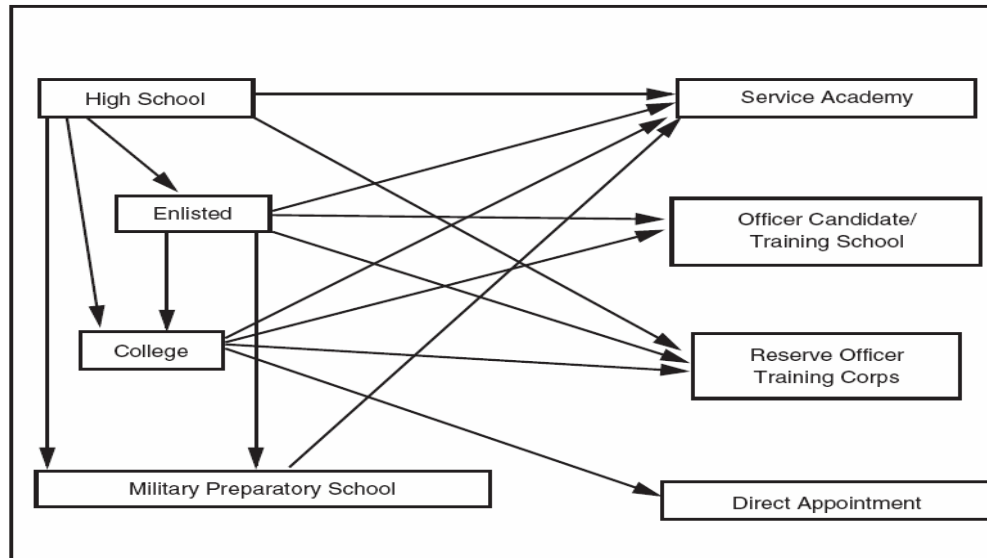


Figure 4. Typical Methods of Becoming an Officer in the Military. (From: Thirtle, 2001).

1. The Naval Academy

According to the U.S. Naval Academy webpage, although President John Quincy Adams inspired Congress to found a naval academy in 1825, the foundation of USNA was realized through the efforts of Secretary of the Navy George Bancroft in 1845. It was founded in Annapolis, Maryland, with a class of fifty midshipmen and seven professors, with the purpose of providing naval officers. The academic plan consisted of four years of academic education, with training aboard ships each summer. After this time, the Naval Academy grew to keep pace with the increasing need for military officers. In 1933, Congress authorized the Naval Academy to award Bachelor of Science degrees. (U.S. Naval Academy webpage)

Although each year more than 10,000 applicants apply for admission, generally only 1,200 are accepted, because USNA is highly selective and capacity is limited. An admissions board reviews the applicant's academic records, medical and dental health, physical fitness, leadership potential, and motivation. All candidates have equal

opportunity, but minority groups generally make up 35% and women 20% of those accepted (U.S. Naval Academy webpage-2013 class).

Acceptance into the Naval Academy is based on several criteria. According to the USNA web page, the basic requirements are that the candidate be (U.S. Naval Academy webpage):

- a United States citizen.
- of good moral character.
- at least 17 years of age and not older than 23 years of age on 1 July of the year of entry
- unmarried
- not pregnant
- without dependents

In addition to these qualifications, an applicant must be scholastically and medically qualified, pass the Naval Academy's physical-aptitude examination or a similar test, and get an official nomination from one of several different sources.

The nomination sources are (U.S. Naval Academy webpage):

- U.S. senators, representatives, and delegates
- the president of the U.S.
- the vice president of the U.S.
- The Navy and Marine Corps (active and reserve)
- Reserve Officers Training Corps units
- children of deceased or disabled veterans, of prisoners of war, or of servicemen missing in action
- children of Medal of Honor awardees

The mission of the U.S. Naval academy is:

To develop midshipmen morally, mentally, and physically and to imbue them with the highest ideals of duty, honor and loyalty in order to provide graduates who are dedicated to a career of naval service and have potential for future development in mind and character to assume the highest responsibilities of command, citizenship and government. (U.S. Naval Academy webpage)

According to the U.S. Naval Academy webpage, to accomplish this mission, the Naval Academy provides an intensive four years of academic and professional training to midshipmen to prepare them as highly qualified naval and Marine Corps officers. Engineering and weapons, mathematics and science, leadership, education and officer development, humanities and social sciences, and professional development are the five main divisions of the curriculum. Midshipmen may choose to study one of the nineteen major fields within these five divisions. Below are the divisions and departments in USNA:

- Division of Engineering and Weapons
 - Aerospace Engineering
 - Electrical and Computer Engineering
 - Mechanical Engineering
 - Naval Architecture and Ocean Engineering
 - Weapons and Systems Engineering
- Division of Humanities and Social Sciences
 - Economics
 - English
 - History
 - Language and Cultures
 - Political Science
- Division of Leadership, Education and Officer Development
 - Officer Development
 - Leadership, Ethics, and Law
- Division of Mathematics and Science
 - Chemistry
 - Computer Science
 - Mathematics
 - Oceanography
 - Physics
- Division of Professional Development

- Professional Programs
- Seamanship and Navigation

According to the U.S. Naval Academy webpage, midshipmen receive an academic education and military training during the four-year program at USNA. The program starts with “plebe summer,” seven weeks designed to make civilians adapt to the academy. Midshipmen undergo various training programs to enhance their military and leadership skills during each summer. Upon graduation, they are generally assigned to ships, submarines, and squadrons, with SEAL teams or Marine units. The minimum-service requirement (MSR) for USNA graduates is five years’ active duty and three years in the reserve forces, starting at graduation. While all healthy graduates are commissioned into the Navy’s unrestricted line (URL), unhealthy graduates are generally commissioned into the restricted line or staff corps specialties such as intelligence, supply corps, or civil-engineering corps. According to a CNA (2008), adding a new midshipman to USNA costs \$215,300. Table 1 elaborates the costs.

Table 1. Marginal Cost of Additional Midshipman at USNA (From: CNA, 2008).

Marginal cost of an additional Midshipman at USNA	
Cost category	\$ in thousands
MPN:	2009 levels
I-Day Transportation	0.4
Midshipmen Pay	85.9
TOTAL MPN	86.3
O&M,N (MISSION):	
Civilian Faculty	78.9
Support Staff	10.9
Academic Materials & Supplies	5.9
Professional Development Program	6.1
Athletic Program	3.1
Food Service	4.0
P. O. Box Rental	0.2
Admissions	0.9
Initial Outfitting Midshipmen	2.8
Initial Outfitting Faculty & Staff	1.2
Initial faculty labs	5.4
Maintenance faculty labs	4.2
IT Support	5.3
TOTAL O&M,N Mission	128.9
O&M,N (BOS):	
Water/Sewage/Utilities	0.2
TOTAL	215.3

DoD composite rate for midshipmen used. Includes \$5,652 annual Medicare Eligible Retiree Health Care accrual.

2. The Reserve Officer Training Corps

According to U.S. NROTC webpage, the Naval Reserve Officers Training Corps (NROTC) program was established in 1926 to provide a comprehensive education and

training in the arts and sciences of naval warfare. The program provides an opportunity for young men to become commissioned officers. NROTC is the largest source of Navy and Marine Corps officers, founded to educate and train individuals as commissioned officers for the unrestricted-line naval reserve and Marine reserve corps. The mission of the NROTC program is:

To develop midshipmen mentally, morally and physically, and to imbue them with the highest ideals of duty, and loyalty, and with the core values of honor, courage and commitment in order to commission college graduates as naval officers who possess a basic professional background, are motivated toward careers in the naval service, and have a potential for future development in mind and character so as to assume the highest responsibilities of command, citizenship and government. (U.S. NROTC webpage)

The NROTC program started in 1926 with only six participating universities: University of California at Berkeley, Georgia Institute of Technology, Northwestern University, University of Washington, and Harvard and Yale universities. NROTC is now provided at over 150 colleges and universities that either host NROTC units or have cross-town enrollment agreements with a host university. Some applicants for the program are selected through a highly competitive national selection process and awarded scholarships. They receive full tuition and other financial benefits at many of the country's leading colleges and universities. (U.S. NROTC webpage)

According to O'Brien (2002), the basic requirements for an applicant to the NROTC program are that he or she must:

- be a United States citizen
- be 17–23 years old
- be a high-school graduate
- be physically qualified
- have excellent moral character,
- have no record of military or civilian offenses
- gain admission to a college that sponsors an NROTC unit
- have a minimum SAT test score of 530 verbal and 520 math or minimum ACT test score of 22 in both English and math

Active-duty enlisted sailors can also attend NROTC programs. There are two types of NROTC programs—scholarship or non-scholarship—with similar minimum service requirements. Upon graduation and commissioning, non-scholarship graduates must serve in the Navy for eight years, of which three and a half years must be in active service. Scholarship graduates have the same MSR, eight years, of which four must be in active service (Korkmaz, 2005).

Table 2 exhibits the cost of an additional midshipman to NROTC, which was \$135,000 in 2008.

Table 2. Marginal Cost of One Scholarship NROTC Midshipman (From: CNA, 2008).

Marginal cost of one scholarship NROTC Midshipman	
Cost category	\$ in thousands 2009 levels
Tuition/Fees	89.3
Book stipend	3.0
Monthly subsistence	12.0
Uniforms	1.2
Summer cruise pay and allowance	2.5
Summer cruise subsistence in kind	0.7
Summer cruise travel	3.1
Initial travel	0.1
Total	111.8
Adjust for 1.5% of scholarship holders that will receive 5th year of scholarship	112.1
Add approximately \$23,000 for 4 years of MERHC accrual for comparison with USNA and OCS marginal costs	135.0

Add \$10,000 for nuclear accession bonus where appropriate

3. Officer Candidate Schools

The Navy Officer Candidate School (OCS) is the most flexible of the commissioning sources, allowing the Navy to fill gaps in the officer corps easily to meet service needs. OCS is also the fastest and easiest way for civilians and non-commissioned officers to become commissioned officers (Thirtle, 2001). According to the U.S. Navy OCS webpage, OCS is stationed at the Naval Aviation School Command in Pensacola, Florida. In order to become a commissioned officer, students have to complete thirteen-week training through OCS. OCS provides academic and military courses and physical-

fitness training to prepare students for future deployments. According to U.S. Navy OCS webpage, the thirteen weeks are very demanding, both physically and psychologically. Course subjects include naval operations, orientation and administration, naval history, strategic deterrence, shipboard management, combat systems, ship control, and surface ships. U.S. Navy OCS webpage states that a candidate for admission to the Navy OCS must:

- be a U.S. citizen
- possess good moral character
- be under age 35 for all designators
- exhibit health and physical fitness
- have a bachelor's degree from an accredited institution
- take the Officer Aptitude Rating (OAR) examination.

Upon successfully completing the course, officers can be assigned as naval aviators, naval flight officers, surface warfare officers, submarine-warfare officers, special-operations officers, special-warfare officers, supply-corps officers, civil-engineering corps officers, aerospace-maintenance duty officers, intelligence officers, cryptology officers, public-affairs officers, and oceanographers (U.S. Navy OCS webpage).

In the Table 3, the cost of an additional candidate for OCS is estimated to be \$21,600 in 2008.

Table 3. Marginal Cost of an OCS Candidate (From: CNA, 2008).

Marginal cost of an OCS candidate at OCS	
	\$ in thousands
Cost category	2009 levels
Annual basic pay and allowances (includes adjustment for attrites in OCS and MERHC accrual). Uses DoD composite rate.	21.2
Other non-labor costs per student	0.4
Total	21.6

4. Enlisted-to-Officer Commissioning Programs

Enlisted-to-officer commissioning programs provide opportunity for exceptional enlisted service members to be commissioned as officers in the U.S. Navy by joining NROTC or OCS programs. A college degree is required. To make it more understandable and practical to apply, the Navy recently combined most of the enlisted commissioning programs into a single program, Seaman to Admiral-21 (STA-21) (U.S. Navy Seaman-to-Admiral Program webpage). According to the U.S. Navy Seaman-to-Admiral Program webpage, the STA is a commissioning program in which sailors keep their benefits, pay, and privileges as active-duty members while receiving a scholarship to obtain their degree and a commission as naval officers. Thanks to STA-21, outstanding active-duty sailors can get a college education and become commissioned officers.

The following enlisted-to-officer commissioning programs were combined to form Seaman to Admiral-21 (U.S. Navy Seaman-to-Admiral Program webpage):

- Seaman to Admiral
- Enlisted Commissioning Program (ECP)
- Aviation Enlisted Commissioning Program (AECP)
- Nuclear Enlisted Commissioning Program (NECP)
- Civil-Engineer Corps Enlisted Commissioning Program (CECECP)
- Fleet Accession to Naval Reserve-Officer Training Corps (NROTC)
- Broadened Opportunity for Officer Selection and Training (BOOST)

Before STA-21, some service members had to pay for tuition and other educational expenses, while some had to be away from active duty. By contrast, the STA-21 program keeps all participants on active duty at their current enlisted pay grade— that is, they will receive all the pay, allowances, benefits, and privileges they currently get and still be eligible for enlisted promotion while in the program.

According to U.S. Navy Seaman-to-Admiral Program webpage, to be eligible for STA-21, sailors must

- be a citizen of the United States
- be recommended by their commanding officer

- have good moral character
- be serving on active duty in the U.S. Navy or Naval Reserve, including Training and Administration of the Reserves (TAR), Selected Reserves (SELRES), and Navy Reservists on active duty except for those on active for training (ACDUTRA) to include annual training (AT) and initial active duty for training (I-ACDUTRA)
- be a high-school graduate
- be able to complete the requirements for a baccalaureate degree in 36 months or less
- be able to complete degree requirements and be commissioned prior to their 31st birthday
- maintain a cumulative grade-point average of 2.5 or better on a 4.0 scale while enrolled in STA-21
- have a SAT or ACT test score
- meet physical commissioning standards
- have no record of certain court or disciplinary actions
- have passed a personal-fitness assessment
- Individuals who have already obtained their baccalaureate degree are not eligible for STA-21 and should apply directly for Officer Candidate School (OCS).

Graduates of STA-21 have to serve five- to eight years in active duty, according to the type of the service upon commissioning. When they complete their program, they are commissioned as an ensign in the United States Naval Reserve. After graduation, newly commissioned ensigns are sent to initial training for their officer community (U.S. Navy Seaman-to-Admiral-Program webpage).

C. SURFACE WARFARE OFFICER CAREER DEVELOPMENT

According to Carman (2008), although the typical SWO career path was standardized and deviations from the norm were discouraged, the current career path has added flexibility and alternative opportunities, due to changing requirements in the SWO community. When officers earn a commission in the Navy and begin their career path as a career designated SWO, they report immediately to a surface ship. They do not attend any formal school; instead, they are expected to learn their job through on-the-job training (OJT).

A newly commissioned officer generally spends a total of 45 months during his first and second division-officer (DIVO) tours. Upon completing the first and second DIVO tours, the officer reaches an exit port, where he has to decide to stay or leave active military service at the 48-month mark (60 months for USNA graduates). If he decides to stay, he has two options: not taking the SWO retention bonus, while signing on for a two- to three-year shore-duty assignment, or taking the SWO bonus and obligating himself for the next six years as a Navy SWO (Browning & Burr, 2009).

Figure 5 illustrates the whole career progression of a SWO. The following sections discuss the career opportunities for surface warfare officers, including potential ports of exit.

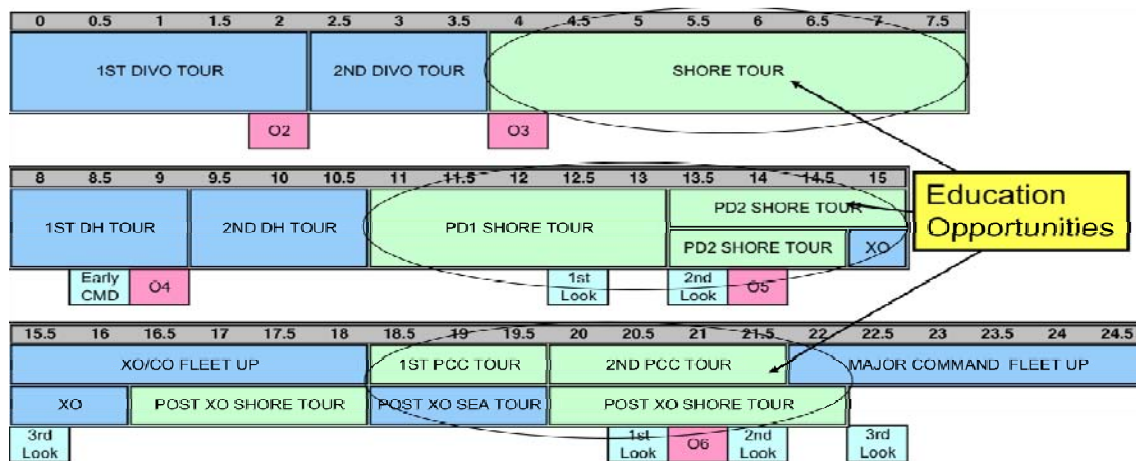


Figure 5. Typical Career Progression for SWO (From: SWO Spouse Brief)

1. Accession through Executive Officer (XO) Tour

Like all naval officers, the surface warfare officer typically comes into the Navy with a four-year college degree. Most of these junior surface warfare officers go directly to sea after graduating from their undergraduate institutions to do their first-tour division-officer job (Carman, 2008). Historically, officers attended the six-month, SWO division-officer school (SWOSDOC) in Newport, Rhode Island, before beginning their first sea tour. But this changed in 2003; officers in year-group 2003 were sent directly to their first sea tour after commissioning. SWOSDOC was replaced by computer-based and on-the-job training aboard ship (called “SWOS at Sea”), followed by three weeks at SWOS in

Newport after about eighteen months (Carman, 2008). In addition to completing SWOS at Sea, division officers (DIVOS) are required to earn their Officer of the Deck Underway (OOD U/W) qualification before continuing to SWOS for a three-week validation course, taught in the classroom with simulators (Carman, 2008).

According to Denmond et al. (2007), during the division-officer tour, surface warfare division officers are supposed to learn their jobs and improve their leadership skills by being assigned to a shipboard division. SWO division-officer tours are designed to provide the hands-on training and development necessary for new officers entering the fleet. While the first DIVO tour takes twenty-four months, the second one typically lasts eighteen months. Generally, DIVO tours are fulfilled in different ships. The main purpose of the first division-officer tour is to develop the junior surface warfare officer's abilities in a variety of areas. Especially it aims to make him a qualified officer of the deck (OOD) and have sufficient expertise in his career field to become a SWO. After this tour, officers deserve to wear the surface warfare officer breast insignia (Denmond et al. 2007). Upon finishing the three-week course, junior SWOs come back to their ship to complete their surface warfare officer qualification before finishing their first DIVO tour. This qualification process is shown in Figure 6 (Carman, 2008).

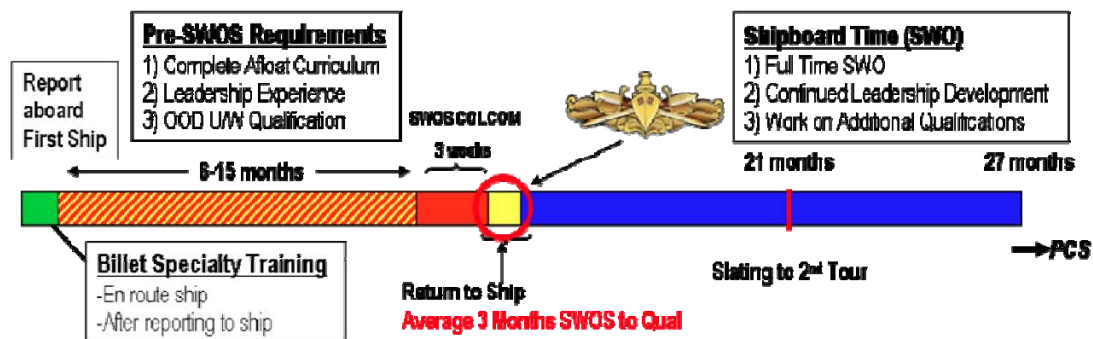


Figure 6. SWO Qualifications During the First Division-Officer Tour (From: Carman, 2008)

Upon completing the first DIVO tour, SWOs are assigned to second DIVO billets on different Navy warships. In this tour, SWOs can choose to continue in the same ship or be assigned to another ship to fulfill the second-tour division-officer job (Denmond et

al. 2007). They perform different, more specialized jobs from the first tour, requiring greater expertise and responsibility and yielding a more diversified background. Typical second-tour jobs are navigator, training officer, or main propulsion assistant (MPA), depending on the type of platform assigned. These second-tour jobs facilitate the achievement of additional qualifications, such as engineering officer of the watch (EOOW) and tactical-action officer (TAO) (Denmond et al. 2007).

Surface warfare officers may serve in a variety of locations around the world. However, most of their first- and second-tour assignments are in major fleet-concentration areas, such as Norfolk, VA; San Diego, CA; Bremerton, WA; Mayport, FL; Pearl Harbor, HI; and Yokosuka, Japan. Upon successfully completing their two afloat division-officer tours, at approximately four years of commissioned service (YCS), surface warfare officers are eligible for their first shore duty (Denmond et al. 2007). According to Carman (2008), various shore billets are available, including graduate-education institutions and various staff duties. SWOs also may complete Joint Professional Military Education (JPME), Phase I, during this period ashore. Typically, junior SWOs complete their MSR while on their second afloat division-officer tour or, at the latest, on their first shore tour. At this point of exit, most of these officers have to decide whether to stay in the Navy. They may decide to leave the Navy, transfer to another community, or continue the SWO career path.

Faced with manning shortages at the department-head level during the past ten years, the Navy has introduced surface warfare officer continuation pay (SWOCP). This special pay is designed to encourage eligible personnel to pursue their SWO careers as afloat department heads, thereby increasing the SWO retention rate in department-head tours. If officers take the SWOCP, they have to complete department-head school, followed by two back-to-back, eighteen-month, department-head tours afloat (Denmond et al. 2007).

If they choose to stay beyond the first shore-duty assignment, surface warfare officers are supposed to report to SWOS for six-month department-head (DH) school. Upon graduation, SWOs are assigned to their first DH tour at sea. In addition to normal

duties, DHs are also expected to qualify as TAOs. Moreover, high performing DHs may have the chance to screen for lieutenant-commander command. (Carman, 2008)

Carman (2008) mentions that SWOs report for their second DH assignment at approximately nine years of commissioned service (YCS). Some officers can participate in IA assignments instead of the traditional second DH assignment. When they complete their first DH tour, officers selected for lieutenant-commander command attend commanding-officer (CO) training at SWOS before assuming executive-officer (XO) and subsequent CO duties.

According to Carman (2008), after they complete the required DH-tour obligation, midgrade SWOs assume various shore-duty assignments, such as graduate education, Junior War College, joint-duty assignments, subspecialty tours, and staff billets. During this period, since the commitment from the junior SWO CSRB and SWOCP expire, SWOs reach another career point at which to decide to stay or leave.

Additionally, lieutenant commanders (LCDRs) can apply for one of six specialty career-path programs, which include (Carman, 2008):

- anti-terrorism/force protection (AT/FP)
- anti-submarine warfare
- missile defense
- mine-warfare specialist
- shore-installation management
- strategic sealift (MSC/MPF)

Acceptance into one of these programs provides the opportunity for executive-officer, special-mission (XO-SM) assignment (Carman, 2008).

Figure 7 displays the current SWO career path from an officer's commissioning through XO tour, with the top gray bar showing cumulative years of commissioned service.

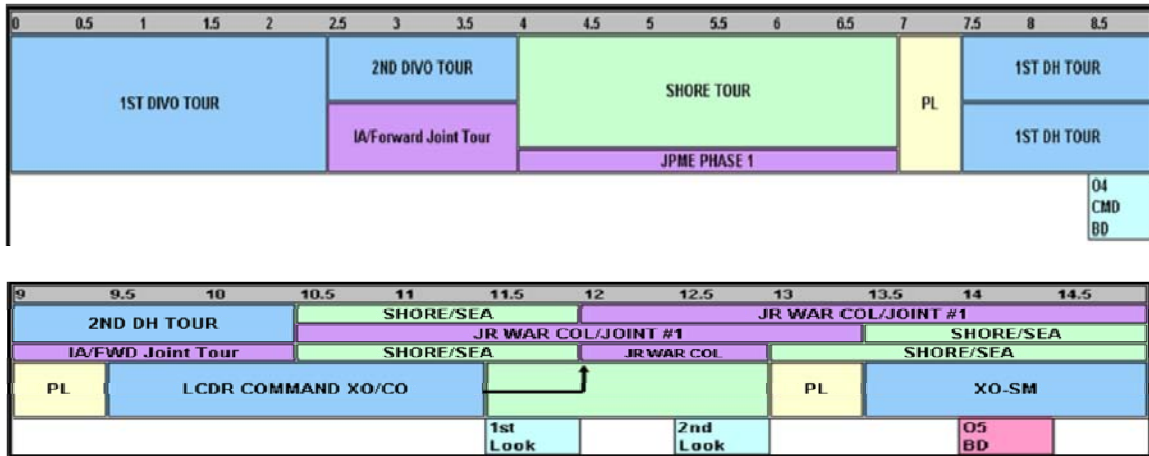


Figure 7. SWO Career Path From Accession Through Executive Officer (XO) Tour (From: Carman, 2008)

2. Commanding-Officer (CO) Tour through Major Command

If surface warfare officers decide to keep on the traditional SWO career path, they then screen for commander command. If selected, they go to SWOS to complete the CO course before beginning command at sea. After completing this course, they are assigned to their respective warships as XO and then they eventually “fleet up” to CO aboard the same ship (Carman, 2008). If they are not selected for commander command, they are deployed in various sea and shore billets. Upon completion of a commander-command tour, SWOs assume a variety of assignments such as Senior War College, joint-duty assignments, subspecialty tours, or staff billets. Since naval officers become eligible for retirement at twenty YCS, they reach a major port of exit (Carman, 2008). They become eligible for lifetime military retirement pay and benefits at this point. However, if SWOs screen for major command, they can expect another command opportunity at approximately 22.5 YCS. After this point, the SWO career path becomes more tentative, because some SWOs compete for flag rank while others choose to retire (Carman, 2008).

Figure 8 illustrates the senior portion of the SWO career path, with the top gray bar continuing the cumulative years of commissioned service.

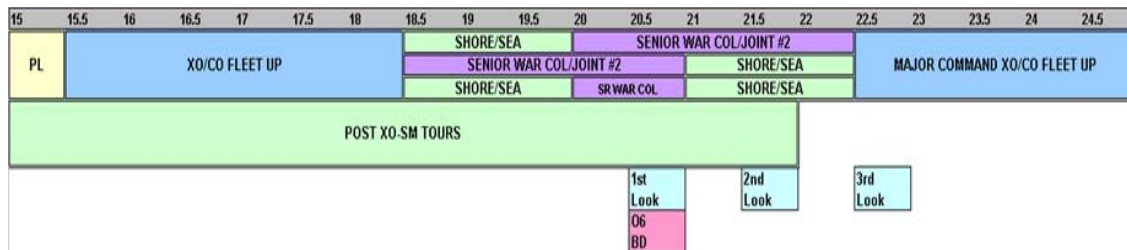


Figure 8. SWO Career Path from CO Through Major Command (From: Carman, 2008)

3. Individual Augmentation (IA) and Global War on Terrorism Support Assignments (GSA) during Shore Duty

According to Carman (2008), SWOs can face individual augmentation (IA) and Global War On Terrorism support assignments (GSA) at different points along the career path during shore-duty intervals. These assignments are generally outside the officer's specialty and require long periods of deployment. Since they are not compensated with a shore-duty assignment extension to make up for lost time at home, officers just come back to their previous shore-duty assignment to complete the time left (Carman, 2008). It is a low possibility to assume these assignments during shore-duty periods. On the other hand, GSA billets are offered to officers as regular assignments at the beginning of the shore-duty slating window, thus increasing the "predictability" of such assignments for officers and their families (Carman, 2008).

Upon completion of GSA requirements, officers assume other shore-duty jobs, if career timing permits. Figure 9 shows a snapshot of the number of SWOs filling IA or GSA billets by rank, with the percentage of total officers participating in these programs depicted on the right y-axis. The majority of surface warfare community IA and GSA assignments affect lieutenants (O-3) and lieutenant commanders (O-4).

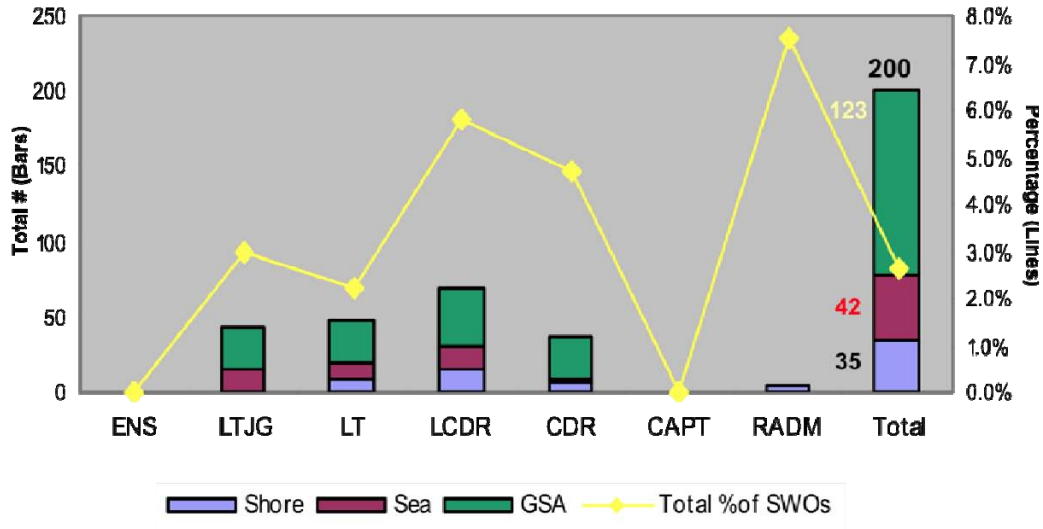


Figure 9. Snapshot of Surface Warfare Officers Filling IA and GSA Billets (From: SWO XO/CO Mentoring Brief 2009)

Figure 10 displays the distribution of SWOs who filled GSA billets throughout the world. As illustrated in this figure, Iraq and Afghanistan have the largest portions of these billets.

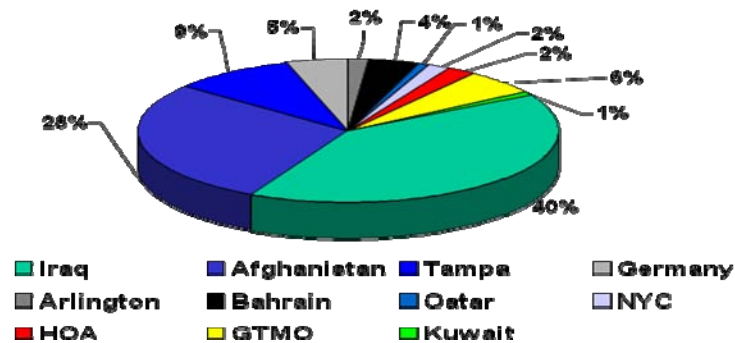


Figure 10. GSA in Terms of Countries (From: SWO Career Planning Seminar, 2010)

D. SURFACE WARFARE OFFICER RETENTION

Retention is defined as the voluntary decision of officers to stay in the military after their MSR. The services set annual goals for retention to meet the number of officers required to carry out missions. Since manning shortages can cause great troubles

within the military personnel system, the military services watchfully track the retention of officers. On the one hand, if few officers are retained, the military faces problems from a lack of experienced leaders and decreased efficiency; on the other hand, the retention of too many officers decreases promotion opportunities and causes many officers to leave involuntary. Unlike nearly all other organizations, the DoD relies completely on its own manpower, and higher-ranking members must be retained and promoted from lower ranks because the military services have a closed personnel system. While most other organizations can and do hire from the outside at all levels, DoD has to obtain required personnel from its own closed system by accession and promotion through all levels. Therefore, if the military services fail to meet recruiting or retention goals at lower levels in a given year, they will have significant problems in producing experienced leaders for subsequent years (GAO-Military Compensation, 2010).

There are many reasons Navy personnel voluntarily leave. The most significant of these are pay, age, tenure, number of dependents, organizational commitment, and satisfaction with work, coworkers, and personnel who leave by their own choice (Korkmaz, 2005). Stoker and Crawford (2008) analyzed the SWO community and found that mentoring was an indirect retention factor. They also found a positive correlation between experienced officers and junior-officer retention. Regardless of the community, retention issues are complex and span many factors; thus, there are different retention views and theories.

1. Recruiting and Retention

As an organization, the U.S. Navy has to compete for manpower with civilian organizations and companies and other military branches. To attract and retain talent, the Navy must offer competitive wages and tangible and intangible benefits. Wages consist of basic pay, allowances, special and incentive pays, annual pay adjustments, and tax advantages (Carman, 2008). Tangible benefits include medical and dental care and reduced-cost life-insurance policies. Intangible benefits include military-specific and general training, education, and the opportunity to serve one's country. When people decide on a career, they always take into account compensation. In the same manner,

individuals compare differences between military and civilian costs and benefits before deciding to join the Navy or to remain in the civilian sector (Carman, 2009).

The entry port for the Navy is accession sources. Anyone can become a commissioned officer through a variety of avenues, such as the U.S. Naval Academy, Naval Reserve Officer Training Corps (NROTC), Officer Candidate School (OCS) or enlisted-to-officer commissioning programs. Since lateral entry is very limited due to the specificity of most military skills, recruiting high-quality officers at the entry level is very crucial (Asch & Warner, 2001). However, the task of recruiting quality officers can be tough, as the Navy must compete with civilian and other governmental organizations for the same talent pool. Moreover, the frequency of deployments and outside opportunities in the civilian sector makes recruitment much harder than before.


In 2008, Navy Personnel, Research, Studies, and Technology (NPRST) carried out a retention “quick poll” to determine career attitudes, needs, and retention intentions of Navy officers and enlisted. Factors assessed in the poll included:

- reasons for joining the Navy
- impact of various potential incentives on current career intentions
- satisfaction with Navy job
- satisfaction with mentoring, career progression, promotions, etc.
- current career intentions

In order to determine contributing factors to joining the Navy, the question below was asked (the responses are exhibited in the Table 4). While base pay is the most important contributing factor, the ability to choose the next assignment is also very crucial. The least important contributing factors are subsidy for daycare and “other” factors.

Q13. Using the scale below, please indicate the extent to which the following factors contributed to your decision to join the Navy (% great extent or very great extent)

Table 4. Top 10 Factors Contributing to Joining the Navy (From: NPRST Quick Poll)



Enlisted		Officers	
Increase in base pay	79%	Increase in base pay	86%
Choice of next assignment geographic location	74%	Choice of next assignment geographic location	84%
Increase in bonus pay	74%	Choice of next assignment	83%
Choice of next assignment	72%	Increase in bonus pay	77%
Retention bonus	69%	Retention bonus	75%
Voluntary education opportunities/TA	68%	Geographic stability	71%
Geographic stability	65%	Flexible work hours	66%
Flexible work hours	64%	Guaranteed fully funded education	57%
Certifications	62%	Certifications	43%
Subsidy for daycare	36%	Payment of student loans	31%
Other	20%	Other	28%
		Subsidy for daycare	28%

Military and civilian organizations have always been challenged in retaining their personnel. When an employee leaves an organization, this separation may be costly. Therefore, organizations focus considerable attention on avoiding unwanted disruption caused by attrition (Clemens, 2002).

Attrition is more problematic for the military than for other organizations. Due to its hierarchical personnel system, personnel separations have a much greater impact on organizational performance and stability than separations in a civilian organization. In the Navy, middle- and senior-grade officers cannot be replaced from the civilian world; instead, they must be filled from promotions of junior officers. It takes time and money before and after commissioning to produce a qualified and experienced officer. Moreover, attrition reduces officer quality, productivity, and recruitment (Clemens, 2002). Therefore, many studies have analyzed which commissioning source is most effective in retaining officers.

In the Navy, officers have a minimum service obligation after commissioning, depending on their commissioning source and the specific officer community to which they are assigned. While the MSR for NROTC graduates is four years, it is five years for Naval Academy graduates. After the MSR has expired, officers reach a port of exit at

which they must decide whether to stay or leave the Navy. At these points of exit, the Navy must attract a certain number of officers in accordance with its manning needs.

If a specific officer community is having problems in convincing the required number of officers to remain, retention bonuses and special pays are offered to enhance the officers' willingness to stay. Generally, the programs oblige receivers to stay for a specified period. According to Carman (2008), SWOs are offered \$50,000 through the Surface warfare Officer Continuation Pay (SWOCP) retention program for committing to two department-head tours, which add approximately five to six years of obligation past the first port of exit. Additionally, SWOs are offered \$25,000 through the Junior SWO Critical Skills Retention Bonus (CSRB) for a similar commitment. SWOCP and Junior SWO CSRB can be taken at the same time, so SWOs are actually offered \$75,000 to remain through two department-head tours—totaling nine- to eleven years of commissioned service (Carman, 2008).

Also, advanced educational opportunities play a key role in convincing SWOs approaching a port-of-exit decision to stay. When they are accepted for an educational program, they have to extend their service based on program length. For example, having a graduate education from the Naval Postgraduate School corresponds to a three-year commitment (Carman, 2008). The Navy uses both monetary and educational incentives as officer-retention tools. However, if officers are not under an obligation associated with a bonus or educational benefit, they are free to leave or stay. Officers' retention decisions are affected by external factors such as the unemployment rate during these critical decision points. Meanwhile, the structure of the military hierarchy is designed to tolerate a reasonable loss of officers at early ports of exit (Carman, 2008).

2. Factors Influencing Retention

a. Human Capital

According to Lehner (2008), human-capital theory is based on the same basic principles as the general theory of investment. When organizations invest in their capital, they expect future profits from the investment. For example, workers invest in themselves by seeking education, migrating, and spending on health care. Organizations

make the decision to invest in their employees to enhance their productivity. This investment includes the education and training of employees.

An organization's primary goal is to motivate employees and increase their productivity by providing incentives. In the meantime, organizations also have to follow the market and overall economy to determine their policies (Lehner, 2008). While investing in human capital, organizations face many difficulties, the most important being that employees may leave the organization prior to fulfilling the return on the human-capital investment made by the organization (Lehner, 2008).

As an organization, the Navy operates within the same human-capital constraint as any other institution. Both are dependent on sufficiently trained and experienced labor. According to Ehrenberg and Smith (2006), one of the human-capital investments that business organizations and individuals engage in is education and training. There are three types of cost associated with investment in human capital and each of them falls into the categories of either specific or general training. These costs are direct expenses, lost earnings, and psychic losses. Direct costs are the cost of education and training. Lost earnings emerge as a result of time spent on training, not on work. Psychic costs are intangible and are the result of mentally challenging or tedious programs. While general training includes work skills that employees can use under various employers, specific training is focused on improving skills that will benefit the employer providing the training. Psychic costs are generally associated with training and education in both civilian and military organizations and they cause stress and pressure on employees. Since SWOs generally receive education and training during the standard workday, they are not supposed to do some of their daily work, and this opportunity decreases these costs. While civilian institutions generally make employees pay for their general training expenses, the Navy bears practically 100% of firm specific and general-training costs (Carman, 2008).

When civilian employers invest in human capital, they seek a return on investment through increased worker productivity and a commitment from the employee until the employer recoups his investment (Ehrenberg & Smith, 2006). According to Carman (2008), while some officers may face additional service obligations, others may

serve such obligations concurrently with existing service commitments. This increases benefits to these service members and decreases return on investment for the Navy. Moreover, the impact of human-capital training investment on individual promotion opportunities, annual pay, or even retention cannot be seen immediately. The first two officer-promotion steps are carried out systematically with time in service and they depend little on performance measures. Only beyond the rank of lieutenant (O-3), do promotions become dependent on individual performance and human-capital growth. Therefore, the Navy cannot determine the long-range effects of human-capital investments (Carman, 2008).

b. Compensation

In addition to factors such as learning a new skill, serving in a favorite location, staying at the same location, or traveling abroad, the overall economy has a great impact on stay–leave decisions. If the economy is growing rapidly, the Navy may face retention problems. On the contrary, when there is an economic crisis throughout the country, retention rate exceeds expectations. Generally, compensation and professional development are major drivers of retention in the Navy. In order to understand the correlation between compensation and retention, it is essential to gain a historical perspective.

According to Asch et al. (2005) study, the Navy faced retention problems due to several reasons during the 1990s. At that time, a robust civilian economy provided attractive opportunities to military personnel, especially to well-educated individuals and those in highly technical areas. Additionally, issues of fairness were rampant in military compensation. Congress tried to overcome this problem by the FY 2000 National Defense Authorization Act. This act raised military pay, increased bonus ceilings, reformed military retirement-benefit options, and increased special pays.

Military compensation consists of a mix of cash, noncash benefits, and deferred compensation, and has been one of the primary tools used by the DoD to recruit and retain service members since the military transitioned to an all-volunteer force in 1973. Since the transition, military pay and benefits have progressively increased.

Historically, the largest component of military compensation is basic pay, allotted to personnel according to their rank and years of service. Over the years, a number of additional benefits have been added to basic pay—some of which may be postponed until after the completion of active-duty service. Figure 11 illustrates the distinctions in the type of military compensation afforded to active-duty service members (GAO-Military Compensation, 2010).

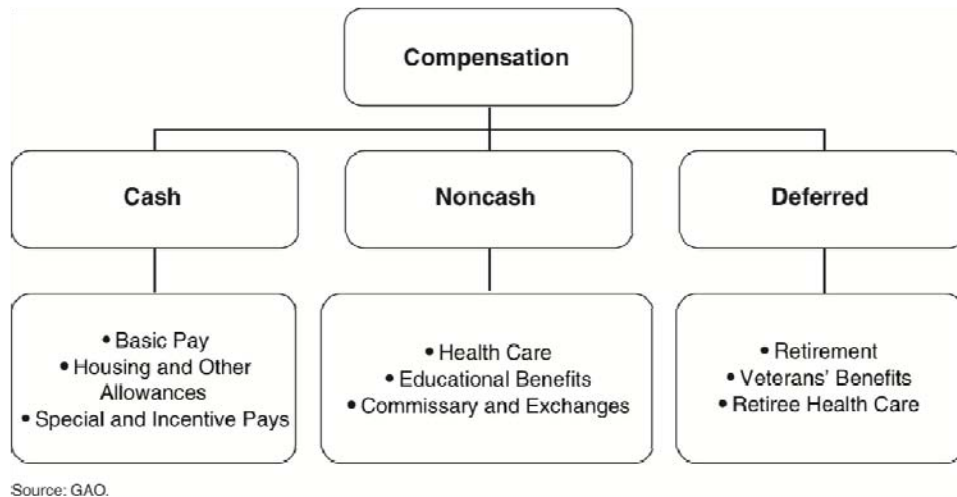


Figure 11. Active Duty Military Pay and Benefits According to Type of Compensation
(From: GAO-Military Compensation, 2010)

Current DoD policy allows the military services to use retention bonuses as a tool to meet DoD personnel requirements. When other alternatives are inadequate, impractical, or less cost effective, monetary bonuses can be used. Monetary compensation should be given to personnel whose performance is valuable in accomplishing missions (Department of Defense, 2005). The current directive states that financial incentives are just one element with which to control personnel inventory, and should not be a substitute for good planning and management.

According to Carman (2008), in 1999, the Secretary of the Navy authorized Surface Warfare Officer Continuation Pay (SWOCP). Today, there are four bonus programs in effect: two for junior officers and two for seniors. Of the programs for

more senior officers, one, called the expanded SWOCP, is for department heads (O-3 and O-4) who are still fit for sea duty. To be eligible for a SWOCP bonus, an officer must (Browning & Burr, 2009):

- be qualified and serve as a surface warfare officer
- be selected for an assignment as a Department Head on a surface vessel and offered a contract by PERS 41
- complete any service commitment incurred through the officer's original commissioning program
- be able to complete the afloat department-head tours or a single longer tour as assigned by PERS 41
- be assigned to fill department-head sequencing-plan billets
- apply prior to graduation from department-head school

Another inducement is the senior SWOCSRB, or senior SWO bonus. The senior SWO bonus is aimed at O-5s and O-6s who serve in critical positions identified by the CNO. Of the four bonuses, the expanded SWOCP and senior CSRB can be identified as more critical, since it takes ten to fifteen years to “grow” a midgrade (O-4) SWO or fifteen to twenty years for a control-grade (O-5) SWO (Carman, 2008).

c. Demographic Factors

Demographic factors such as age, marital status, race, gender, dependent status, and educational background also affect the stay-leave decision. Officers with higher ages at commissioning may be considered more experienced and more productive. Increased productivity would indicate higher levels of professional success over less productive officers. Higher levels of success will likely lead to more satisfaction with the job and longer service time than that of officers commissioned when younger.

The literature also shows that ethnicity affects the retention of officers. Minorities tend to stay in the service longer than white officers. In most of the literature, females are more likely to leave because they are more likely to experience interrupted careers, mostly because of family responsibilities. Married officers tend to have longer careers.

Since the repeal of the Combat Exclusion Act (CEA), women have been allowed to access to the aviation and surface warfare communities. In fact, if women access through USNA or the NROTC scholarship program, they are essentially required to access to the unrestricted line. Since the repeal of the CEA, many women officers come through USNA or the NROTC scholarship programs; these programs have become significant contributors to gender diversity (CNA study, 2008)

Figure 12 shows women's participation rate in the SWO community. While it kept the same level (2%-5%) during 1980s, it has been dramatically increasing since the 1990s.

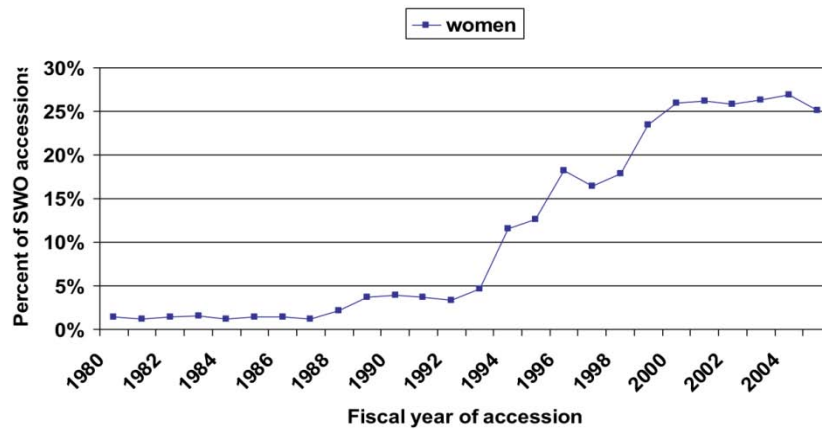


Figure 12. Rate of Women Accessions for SWO (From: CNA study, 2008)

Figure 13 shows the distribution of racial/ethnic diversity in the SW community. Whites are the largest proportion (approximately 70%) and African-Americans, Hispanics and others share a similar participation rate (approximately 9%).

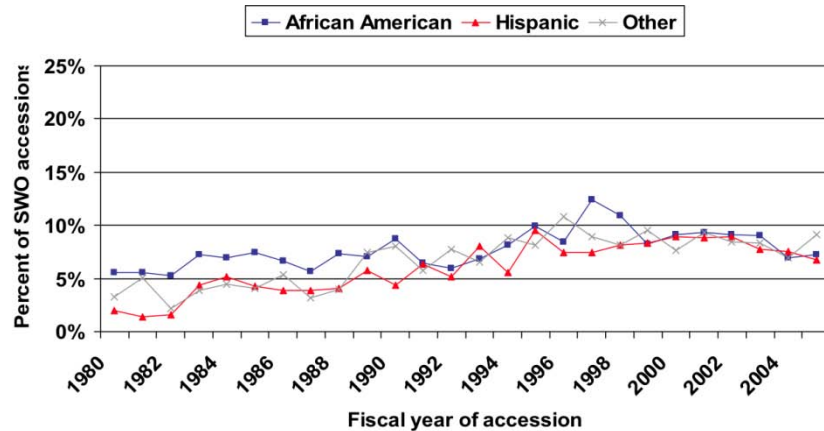


Figure 13. Rate of SWO Accessions by Race/Ethnicity (From CNA study, 2008)

In addition to the effect of commissioning source on retention, Karakurumer (2010) also analyzed in his thesis the effect of demographic factors on the retention of U.S. Air Force officers. This study finds that female, single, and white officers are less likely to stay than male, married, and black officers, respectively. Additionally, officers with more than one dependent and officers who were older at commissioning were found to be more likely to stay than officers with no or one dependent or who were younger at commissioning. Among the independent variables that represent the professional and educational background of individuals, officers with master's degrees or other graduate degrees were found to be more likely to stay than officers with baccalaureate degrees. This result suggests that advanced education increases the probability of retention.

In 2010, the Military Leadership Diversity Commission (MLDC) assessed the retention rates of the services in terms of gender and race/ethnicity. They used data from FY 2000–FY 2008 in order to focus on recent officer continuation patterns. According to MLDC's report, cumulative continuation-rate (CCR) curves decline as YOS increases. This is displayed in Figure 14 for the Navy. In all figures, women have lower continuation rates than men. That is, regardless of service branch, the red lines (women) are always lower than orange lines (men). During the first three years of service, men and women have similar continuation rates. By the time officers have completed their fourth year of service, however, gender differences in continuation rates

begin to emerge and increase with YOS through roughly the YOS 8 to YOS 12 points. By YOS 10, the difference between male and female CCRs is fifteen points in the Navy. In other words, although the continuation rate decreases with YOS for men and women, women's continuation rates decline faster than those of men. This difference is likely the result of retention rather than promotion, because it emerges before the first competitive promotion point. Beyond YOS 12, the gender gap begins to narrow. By YOS 19, when officers will reach the twenty-year mark within the next year, the gap is 13 percentage points in the Navy. These roughly parallel cumulative continuation rates suggest that continuation behavior is similar for men and women during these later years. After YOS 20, the gender gap narrows at an even faster pace. At YOS 30, the difference in CCRs between men and women is less than 5 percentage points.

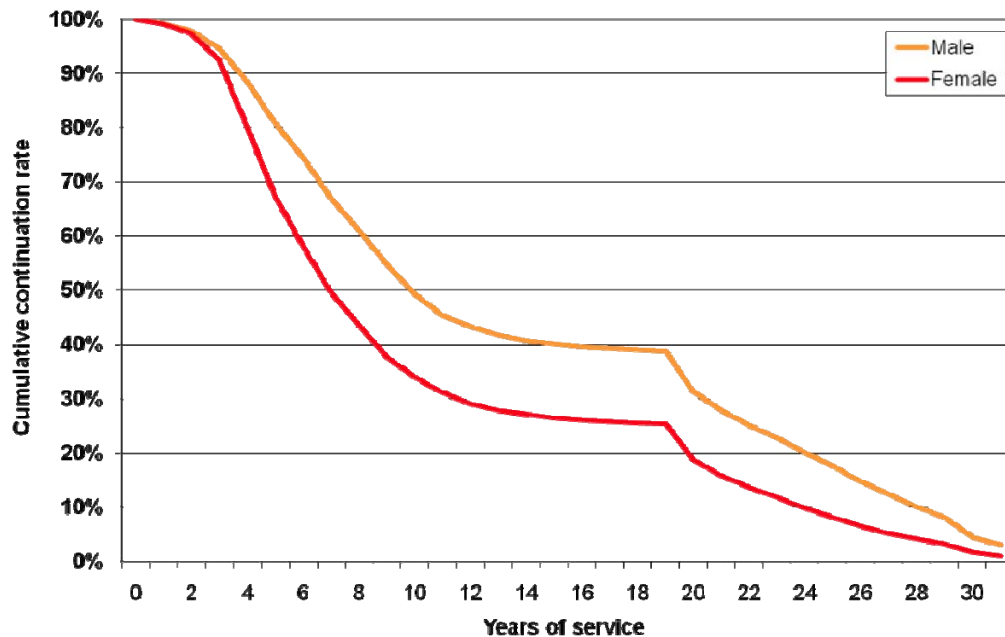


Figure 14. Cumulative Continuation Rates for Men and Women in the Navy, FY 2000–FY 2008 (From: MLDC, 2010)

Officer continuation rates by race/ethnicity for the Navy are depicted in Figure 15. In the Navy, Asian/ Pacific Islanders (PIs), and whites have similar continuation rates across all YOS, while blacks and Hispanic continuation rates are even closer.

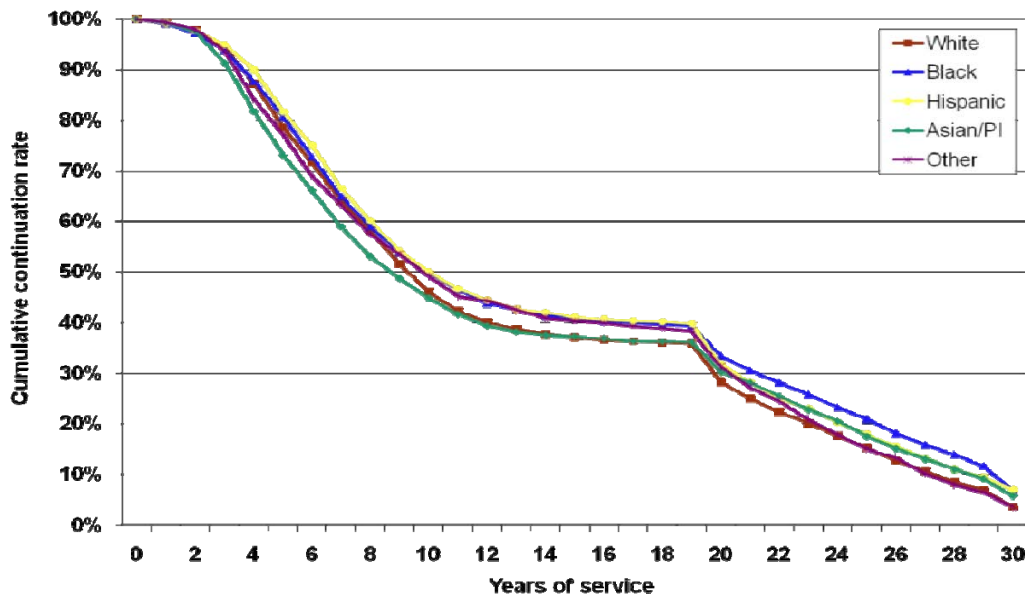


Figure 15. Cumulative Continuation Rates in the Navy, by Racial/Ethnic Status, FY 2000–FY 2008 (From: MLDC, 2010)

d. Job-Related Retention Factors

Job characteristics can be different based on the community. Deployments may have advantages and disadvantages that affect stay–leave decisions for sailors. Especially, the type and quantity of deployments may have a direct impact on decisions, depending on whether one enjoys the deployment experience. If individuals have negative experiences, it may cause them to leave the military. Studies suggest that deployment has a negative effect on retention. Since peacetime assignments do not carry the same operational stress as wartime assignments, deployments during peacetime tend to have a positive effect while hostile deployments have a negative effect on retention of midgrade officers on retention (Fricker, 2003).

Several studies show that there is a strong correlation between high job satisfaction and retention, and job satisfaction strongly depends on job performance and leadership. Since job satisfaction, job performance, and leadership strongly relate to retention, they must not be ignored in any analysis of SWO retention. These determinants, however, are difficult to measure. Applebaum et al. (2003) defines job satisfaction as “a general attitude toward one’s job; the difference between the amount of

rewards workers actually receive and the amount they believe they should receive.” This may seem to imply that financial compensation is the only indicator of an employee’s likelihood of job satisfaction, but it is crucial to emphasize that employers also use non-monetary rewards to motivate their employees. Within the job-satisfaction literature, job performance and quality of leadership are the two most significant contributors to an employee’s job satisfaction. In 1987, McEvoy and Cascio conducted a meta-analysis of twenty-four studies that analyzed the relationship between job performance and employee turnover. The results show that higher performance often leads to higher satisfaction, which in turns helps to reduce turnover. They found that job performance generally predicts turnover at a level comparable to organizational commitment, job satisfaction, and behavioral intentions (Roy, 2007).

Since job satisfaction, quality of command leadership, deployments, and other job related factors are very important in stay–leave decisions of officers, NPRST asked some crucial questions relevant to retention issues in its retention “quick poll” to gauge satisfaction with the Navy. The results are exhibited in Tables 5 through 8 and Figures 15 through 22.

Q12. How satisfied are you with your current rating/designator?

Q33. Considering everything, how satisfied are you with your Navy job?

Q34. Considering everything, how satisfied are you with Navy life?

Q35. Considering everything, how satisfied are you overall with the support the Navy has provided for you and your family?

Figure 16 shows that approximately 80% of officers are satisfied with their job; 73% are satisfied with Navy life; and 68% are satisfied with Navy’s support to them and their families.

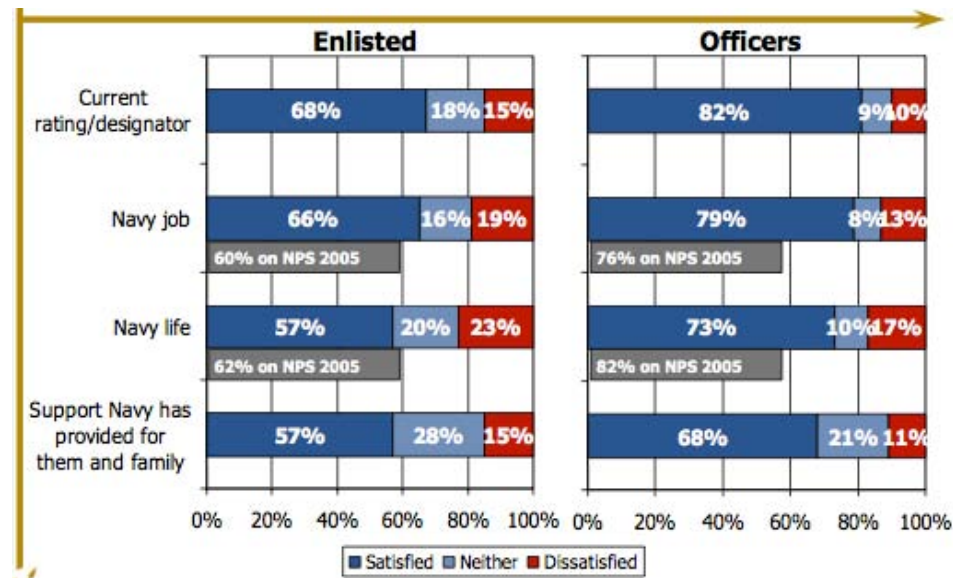


Figure 16. Satisfaction With Navy (From: NPRST Retention “Quick Poll”)

Since family support for officers to stay in the Navy is also part of job satisfaction, it is crucial to get family opinions on stay-leave decisions. Figure 17 indicates that while 55% of married officers’ spouses support staying, 35% of them do not.

Q36. Does your spouse think you should stay on or leave active duty?
(% of married respondents reported)

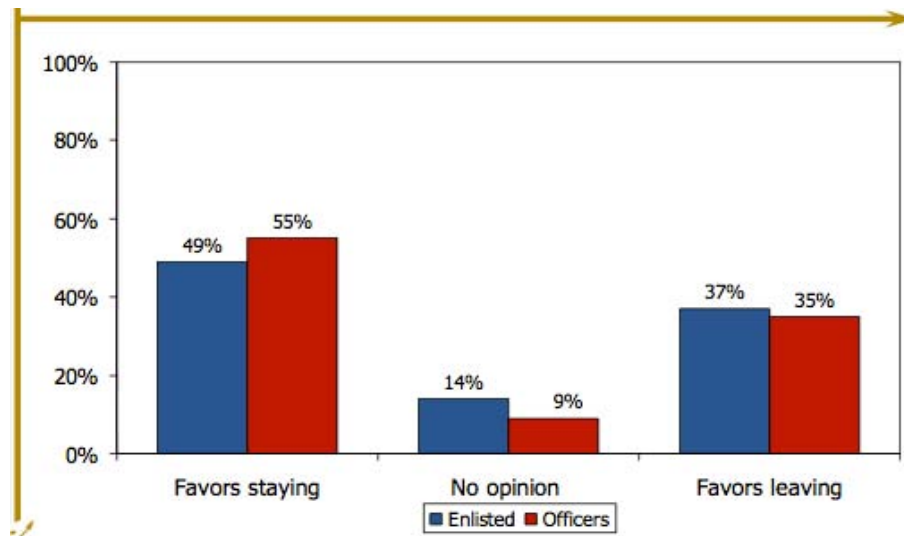


Figure 17. Spousal Support for Staying in the Navy (From: NPRST Retention “Quick Poll”)

The prior studies mentioned above suggest that workplace climate affects job satisfaction and has a substantial impact on retention. Questions about workplace climate and results are displayed in subsequent figures. According to Figure 18, satisfaction with the amount of challenge, responsibility, and freedom on the job is very high (80%), while feelings of accomplishment were less (73%).

Q26. Please rate how SATISFIED or DISSATISFIED you are with the following aspects of your workplace climate.

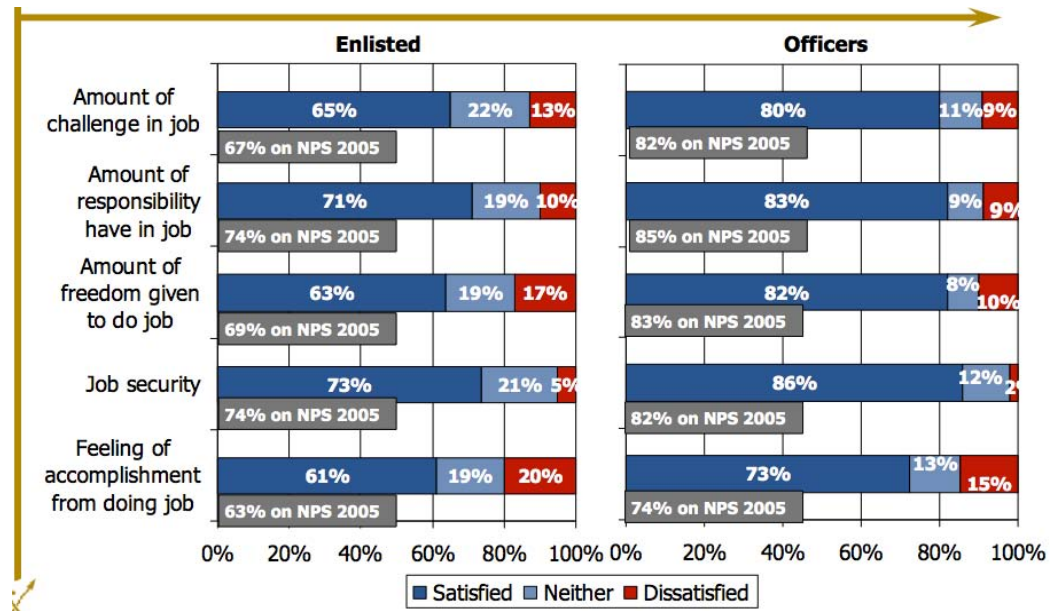


Figure 18. Workplace Climate (From: NPRST Retention “Quick Poll”)

Figure 19 shows that satisfaction with opportunity for personal growth and physical working conditions is 76%, and with availability of parts and supplies is 53%.

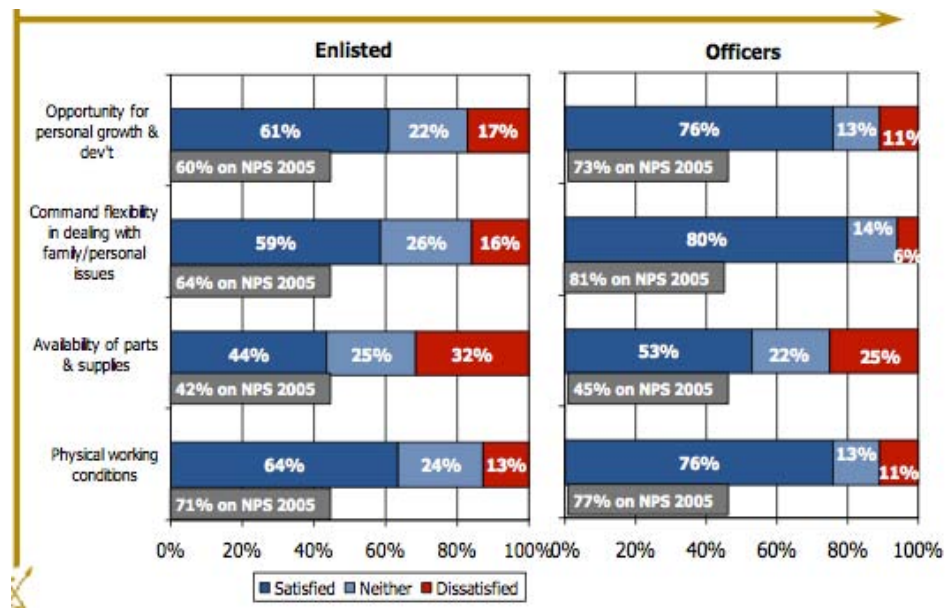


Figure 19. Figure 19. Workplace Climate, Cont'd (From: NPRST Retention "Quick Poll")

The Poll attempted to gauge retention intentions via two separate questions. According to Figure 20, while 53% of officers consider staying till the next decision point, 23% do not consider staying and 66% of officers who want to stay until the next decision point, consider staying for a full career.

Q14. How much do you AGREE or DISAGREE with the following statements regarding your current career plans?

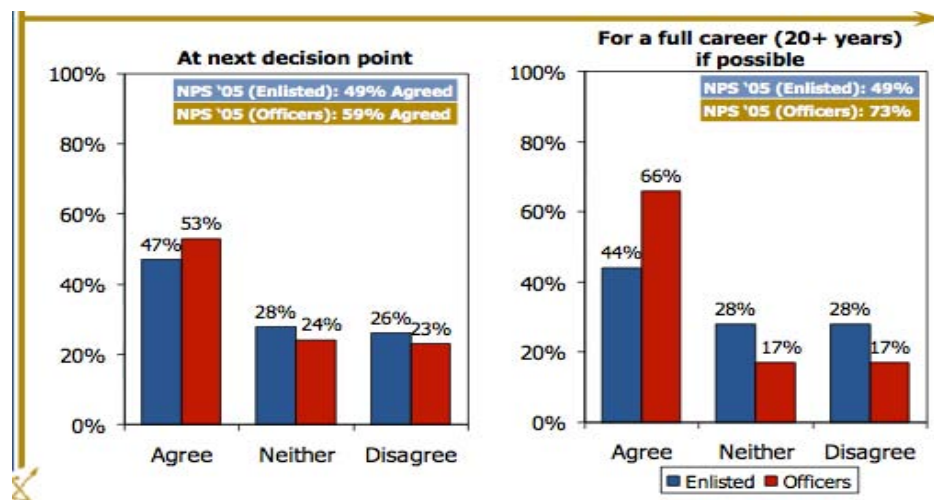


Figure 20. Current Retention Intentions (From: NPRST Retention "Quick Poll")

Since determining factors in retention was the main purpose of the poll, the question below asks the top ten reasons to stay in the Navy and results are exhibited in Table 5. According to Table 5, while patriotism and medical and retirement benefits are the top leading reasons, working relationships, the Global War on Terrorism, and current job satisfaction are the least important factors that lead officers to stay in the Navy.

Q15. Using the scale below, please indicate whether the following factors have influenced you (contributed to your decision) to stay, influenced you to leave, or had no effect on your Navy career intentions. (% 1 - Influenced to stay, 2, or 3).

Table 5. Top 10 Reasons To Stay In The Navy (From: NPRST Retention “Quick Poll”

Enlisted		Officers	
Medical/dental benefits	77%	Patriotism	87%
Job security	73%	Medical/dental benefits	85%
Access to educational programs*	70%	Retirement benefits	85%
Educational benefits*	70%	Job security	77%
Patriotism	70%	Other benefits	72%
Other benefits	69%	Career assignments*	68%
Retirement benefits	67%	Promotion/advancement opportunities	65%
Global War on Terrorism	56%	Working relationships at command*	65%
Access to training programs*	54%	Global War on Terrorism	64%
Promotion/advancement opportunities	53%	Current job satisfaction*	64%

*Denotes factor unique to subgroup’s top 10 list

In the same manner, to determine the top ten reasons for leaving the Navy, the question below was asked and results are displayed in the Table 6. The results show that deployment, and its effect on the family, has substantial weight in the decision to leave.

Q15. Using the scale below, please indicate whether the following factors have influenced you (contributed to your decision) to stay, influenced you to leave, or had no effect on your Navy career intentions. (% 7 - Influenced to leave, 6, or 5).

Table 6. Top 10 Reasons To Leave From The Navy (From: NPRST Retention “Quick Poll”)

Enlisted		Officers	
Overall time spent away	62%	The impact of deployments on family	68%
The impact of deployments on family	56%	Overall time spent away	64%
Unpredictability of deployments	54%	The impact of being in Navy on family	64%
The balance between work and personal time	51%	Red tape (administrative barriers) required to get the job done	61%
Frequency of deployments	50%	Unpredictability of deployments	58%
Length of deployments	49%	The balance between work and personal time	58%
The impact of being in Navy on family	47%	Length of deployments	52%
Red tape (administrative barriers) required to get the job done	43%	Frequency of deployments	50%
Number of hours put in on an average day	40%	Individual Augmentee assignments*	49%
Amount of your base pay*	37%	Number of hours put in on an average day	49%

*Denotes factor unique to subgroup’s top 10 list

In order to determine the effectiveness of various incentives on retention, the question below was asked and answers are shown in the Table 7. The results suggest that increase in pay and ability to choose the next assignment, are the most effective incentives, while subsidy for daycare and other incentives are least effective.

Q116. What impact would the following incentives have on your decision to continue your naval service? (% Greatly increase desire to stay, Increase desire to stay)

Table 7. Impact of Incentives on Retention Intentions (From: NPRST Retention “Quick Poll”)

Enlisted		Officers	
Increase in base pay	79%	Increase in base pay	86%
Choice of next assignment geographic location	74%	Choice of next assignment geographic location	84%
Increase in bonus pay	74%	Choice of next assignment	83%
Choice of next assignment	72%	Increase in bonus pay	77%
Retention bonus	69%	Retention bonus	75%
Voluntary education opportunities/TA	68%	Geographic stability	71%
Geographic stability	65%	Flexible work hours	66%
Flexible work hours	64%	Guaranteed fully funded education	57%
Certifications	62%	Certifications	43%
Subsidy for daycare	36%	Payment of student loans	31%
Other	20%	Other	28%
		Subsidy for daycare	28%

Prior studies suggest that the quality of command leadership is very critical in officers' stay-leave decisions. While good leadership may encourage officers to stay in the Navy, bad leadership may force them to leave. Questions were asked concerning leadership factors, and the results are exhibited in the following figures. According to Figure 21, 76%–77% of officers thought that leaders provided adequate support and guidance and dealt well with subordinates; 86% agreed that leaders have adequate training and expertise to carry out their jobs.

Q32. How much do you AGREE or DISAGREE with the following statements about your overall COMMAND LEADERSHIP (CO, XO, OIC, CMC/COB)?

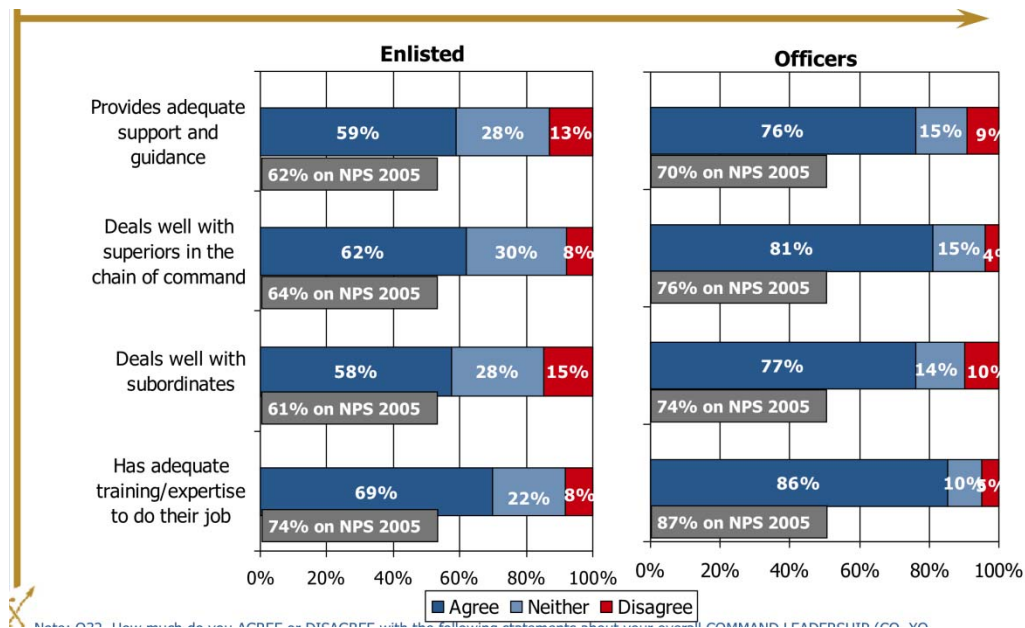


Figure 21. Command Leadership (From: NPRST Retention “Quick Poll”)

Figure 22 indicates that 78% of officers were satisfied with command leadership and thought it responsive to needs and concerns.

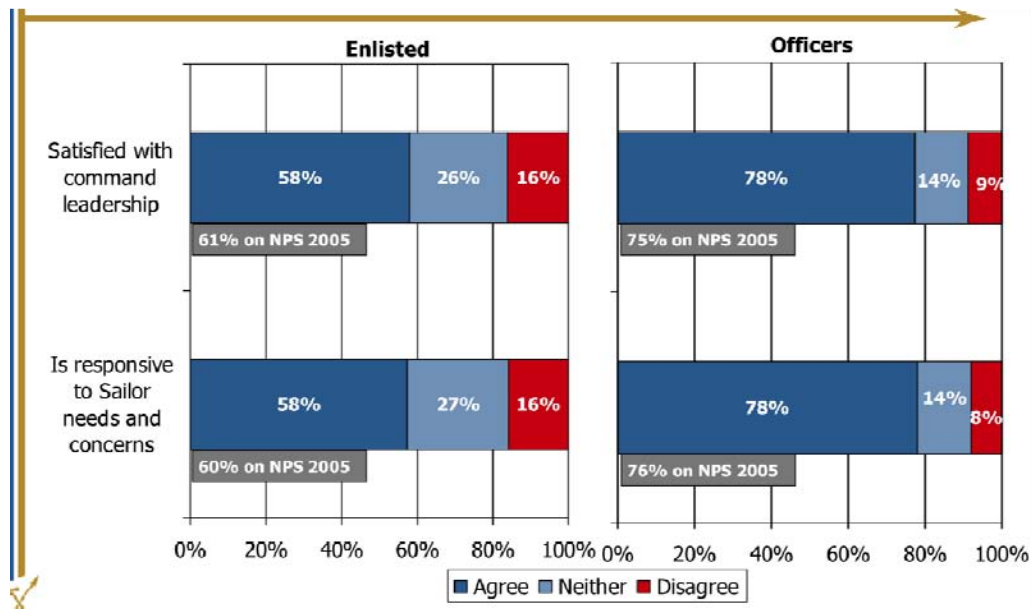


Figure 22. Command Leadership Cont'd (From: NPRST Retention "Quick Poll")

e. Commissioning Sources

Previous studies suggest that the commissioning source has a significant impact on retention. Bowman (1995) developed a model to determine the effect of the three major commissioning sources on retention. He estimates nonlinear (probit) regression models of retention and promotion to predict the independent effect of accession sources. Results are shown in the Table 8. They represent the estimated effects of each commissioning program on the probability of retention and promotion for each URL community. The model assumes USNA as the base group and measures the effect of being a graduate of ROTC or OCS compared to Naval Academy graduation. For all URL officers, ROTC graduates are 6.2 points less likely to stay to the O-4 board than USNA graduates and OCS graduates are 14.9 points less likely to stay than USNA graduates. USNA has significantly higher retention rates than the other two commissioning sources, except in the NFO community. Regarding the higher-ranking boards, the only significant result for URL officers is that OCS has a 6.5-point lower probability of retention to the O-6 board.

Table 8. Nonlinear (Probit) Model Results (Compared to Naval Academy Graduates) (From: Bowman,1995)

	URL		SUB		SURFACE		PILOT		NFO	
	ROTC	OCS	ROTC	OCS	ROTC	OCS	ROTC	OCS	ROTC	OCS
<u>RETENTION:</u>										
ENS TO LCDR	-.062**	-.149**	-.085**	-.184**	-.069**	-.107**	-.038*	-.230**	+.019	-.036
LCDR TO CDR	+.001	-.004	-.019	-.060*	+.007	-.005	-.024	-.027	+.041**	+.050**
CDR TO CAPT	+.004	-.065**	-.009	-.032	-.000	-.075**	+.007	-.046*	+.015	-.066
<u>PROMOTION:</u>										
ENS TO LCDR	-.065**	-.034**	-.050*	-.087**	-.056**	-.032	-.079**	-.012	-.093**	-.040
LCDR TO CDR	-.099**	-.152**	-.139**	-.159**	-.112**	-.150**	-.056**	-.088**	-.087**	-.162**
CDR TO CAPT	-.051**	-.078**	-.101*	-.278**	-.085**	-.090**	+.004	+.025	+.093	-.010

Bowman, 1995

* = 90% significance

** = 95% significance

Mehay and Bernard (2003) conducted a study on commissioning programs to provide guidance for policymakers making decisions on future accessions. These decisions inevitably include formulating the optimal mix of officers from each of the commissioning sources. Their study utilizes the retention of graduates from the three commissioning programs, as well as promotion to O-4 boards. The analysis looks at 17,134 URL officers and promotion-board results between fiscal years 1986 through 2001. The analysis employs multivariate, nonlinear logit models for retention and promotion to measure the effectiveness of the commissioning sources.

Table 9 exhibits retention rates for ROTC scholarship, ROTC-contract, and OCS graduates, as compared to USNA graduates. It shows that ROTC-scholarship and OCS graduates are significantly (at .05 level) less likely to stay in the Navy to O-4 than USNA officers (9% and 17% less likely, respectively). As for the ROTC-contract graduates, the result statistically is not significant and there is not much retention difference between ROTC-C and Naval Academy graduates.

Table 9. Summary of Retention Results for URL Officers (From: Mehay and Bernard, 2003)

ACCESSION SOURCE	PARAMETER ESTIMATE	% CHANGE FROM BASE
ROTC-S	-.1764**	-9.2%
ROTC-C	.0577	3.0%
OCS	-.3193**	-16.7%

**=Significant at .05 level

E. SURFACE WARFARE OFFICER PROMOTIONS

The Navy promotion system chooses the required number of desired, quality officers to implement its missions. In order to accomplish this goal, the Navy promotes an adequate number of officers as openings occur. An impartial and effective promotion system enables the Navy to sustain the strength in each grade and ensures retaining a highly qualified and motivated officer force by providing reasonably consistent and visible progression patterns for all competitive categories, to select the best-qualified officers. Promotions through lieutenant (O-3) are based on meeting minimum requirements and qualifications only, whereas promotion to lieutenant commander (O-4) and more senior pay grades relies on the judgment of promotion boards.

1. Promotion

Since there is no lateral entry opportunity, the Navy heavily depends on its promotion system to find qualified officers for its senior ranks. While SWOs are promoted through lieutenant (O-3) depending on their qualifications, minimum time in rank, and minimum time in service, they are selected by statutory boards for subsequent ranks based on their performance and background (Asch & Warner, 2001). According to Carman, (2008), officers' worth increases as they are promoted for higher levels due to increased human capital and the importance of high-level assignments. Moreover, since high-ranking officers have a great impact on their subordinates' performance and motivation, their competency creates a butterfly effect on troop achievement. This creates a synergy and increase in total productivity for the Navy, thus making high-quality

officers even more indispensable (Carman, 2008). Figure 23 is a graphical depiction of the inverse relationship between the officer inventory size and the value of officers to the Navy at each rank.

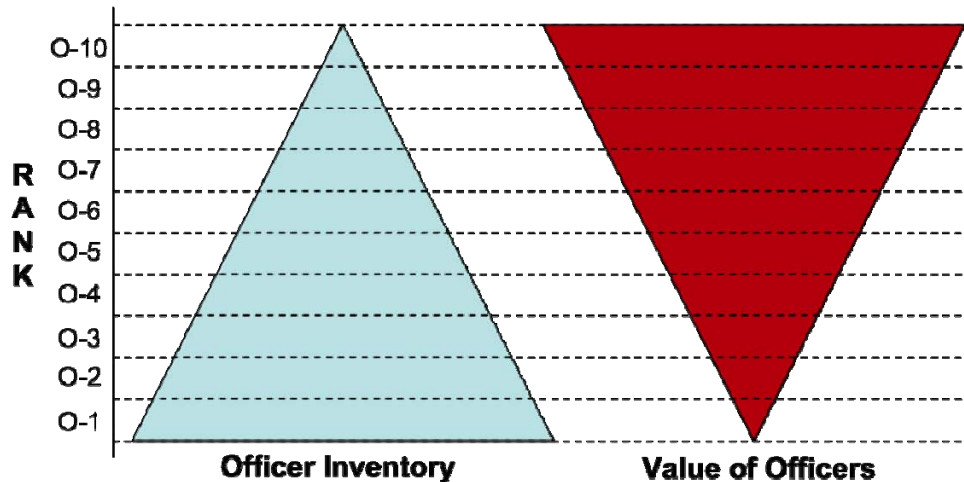


Figure 23. Inverse Relationship between Officer Inventory and the Value of Officers to the Navy (From: Carman, 2008)

The Navy's statutory officer-promotion boards assemble annually and select qualified officers for promotion to O-4 and higher levels, based on the quality of their service record. The "precept" is a document that is approved by the convening authority and directed to the president of the board (Rogers & Grose, 2003). This document provides general and specific guidance to the statutory board regarding the criteria upon which their selections should be based. The precept provides several important factors for the board to take into consideration, such as board membership, promotion percentages, and any specific guidance for the Navy's special needs at that time. The statutory boards consider both the precept and other sources of information while selecting qualified officers for promotion. According to Rogers and Grose (2003), the other sources are:

- personnel-record microfiche: contains an officer's fitness reports (FITREPS), photograph, personal awards, and other matters of official record

- Officer Summary Record (OSR)/Performance Summary Record (PSR): an officer's career résumé, containing a summary of his microfiche
- any correspondence the officer submits to the board about his record

The board does not take into account any information other than what is listed above.

Asch and Warner (2001) suggest that individuals are evaluated on both ability and work effort during the promotion process. The statutory boards take into account both these characteristics, which are written in service records, while selecting officers for promotion. However, sometimes, unobserved factors may also affect promotion decisions. Promotion boards consider officers who are “fully qualified” and then select those who are “best qualified.” Fully-qualified officers are able to perform the duties of the next-higher pay grade, while best-qualified status is assigned to officers after being evaluated in the following four areas (Carman, 2008):

- proven and sustained performance
- education, personal, and professional development
- ability to meet statutory promotion objectives
- achievement of competency and skill requirements

According to Carman (2008), there is a limited number of openings for senior-ranking officers, due to the hierarchical structure of the Navy. Beginning with the rank of lieutenant commander (O-4), the Navy limits the number of officers to be promoted to the next rank. Based on this restriction, the promotion system acts as a contest, in which officers compete with their peers for a limited number of promotion slots (Carman, 2008). Due to this rivalry, officers have to increase their work effort and reduce individual slacking. Since higher retention rates cause more officers to compete with each other during promotion cycles, this causality increases the quality of cohort at the next rank and makes the competition harder (Carman, 2008).

In addition to voluntary separation, the Navy's promotion system contains an “up-or-out” clause (Asch & Warner, 2001). If officers (O-2 through O-4) cannot promote to the next rank after two annual promotion cycles, they can be processed for involuntary separation. In some occasions, even if they cannot promote to the next rank in two tries,

most lieutenant commanders (O-4) generally are allowed as active duty until retirement at twenty years of service. As for commanders (O-5) and captains (O-6), they have similar “up-or-out” requirements and mandatory retirement by twenty-eight and thirty years, respectively (Carman, 2008)

2. Promotion Zones and Promotion Timing

Carman (2008) suggests that eligibility for promotion is determined by the secretary of the Navy’s annual promotion plan, which sets up promotion zones for surface warfare officers. Promotion zones are the number of officers needed to fill projected personnel requirements and they are established for each grade and competitive category. Promotion zones categorize which officers are eligible for evaluation for promotion to a specific grade, based on lineal seniority. Zone size is a function of promotion opportunity. Promotion-zone opportunity is calculated as the numbers to be recommended for promotion divided by the number of officers in a promotion zone. Officers are categorized as “in zone,” “below zone,” and “above zone.” (Carman, 2008).

Above-zone: Officers in this zone have been previously reviewed in the in-zone population, but were not selected for promotion by the board.

In-zone: Officers in this zone include the primary population eligible for consideration by the selection board.

Below-zone: Below-zone officers are junior to other officers in the promotion zone. If not selected, these officers do not acquire a failure of selection. This group is a rough estimate of the following year’s in-zone population. According to Carman (2008), Title 10, USC, limits the number of below-zone officers that can be selected to 10% of the “authorized to select number.” Officers who are “below zone” and “above zone” may be considered for promotion as approved by the secretary of the Navy (Carman, 2008). The promotion timing and promotion opportunities for promotion to lieutenant, junior grade (O-2) through captain (O-6) are exhibited in Figure 24.

DoD Parameters

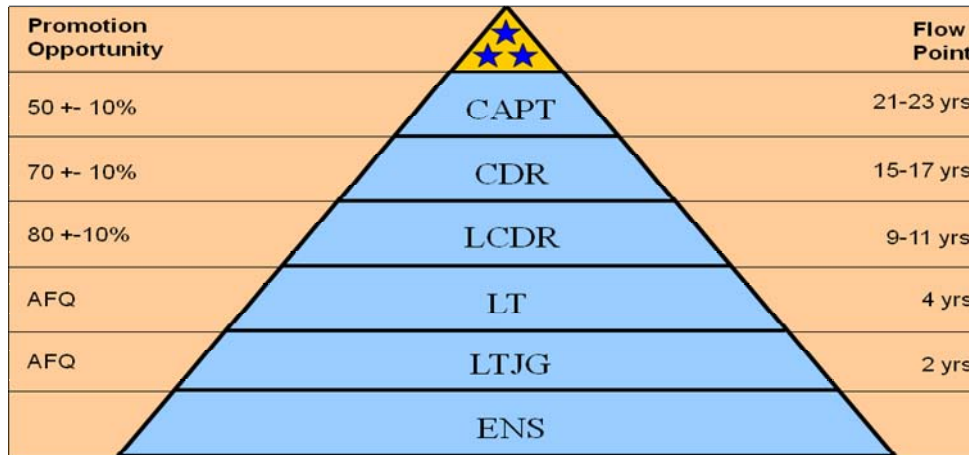


Figure 24. Flow Point (Promotion Timing) and Promotion Opportunities (From: Active Officer Promotion Brief)

Promotion timing (promotion flow point) is the average years of commissioned service before eligibility for promotion to the next rank (Yardley et al., 2005). For instance, lieutenant (O-3) SWOs will be in zone for promotion to lieutenant commander (O-4) at approximately ten years, plus or minus a year, of commissioned service. According to Yardley et al. (2005), promotion opportunity refers to the percentage of all officers selected for promotion from above, in, and below the zone. The Figure 25 shows an example of promotion opportunity. If we assume that there are sixty officers from Above Zone (AZ) and forty officers from In Zone (IZ) and only twenty officers will promote to next rank, then officers have a 20% chance of promotion. Planners develop annual promotion plans and use selection percentage guidelines, along with the number of vacancies, to determine the number of officers in the zone for selection.

Promotion Opportunity

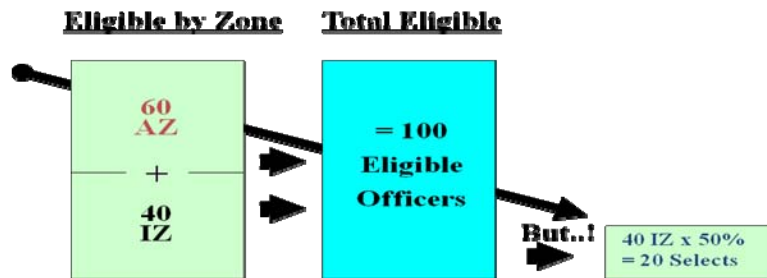


Figure 25. Illustration of Promotion Opportunity (From: “Active Officer Promotion Brief”)

According to the “Active Officer Promotion Brief,” performance is the most important factor used by promotion boards in determining promotions. The precept outlines certain specific needs the Navy has from year to year, but the motto “best and fully qualified for the needs of the Navy” still applies. Board members have experience in the Navy and have faced the choices and decisions that officers have to make in their careers. They know what the hard jobs are.

Active Officer Promotion Brief suggests that while performance is still the number-one indicator, officers can certainly enhance their competitiveness by getting additional qualities and subspecialties and pursuing advanced degrees. Doing the right thing at the right time is crucial. For example, a tour at postgraduate (PG) school may be good for one’s career, but if one’s contemporaries are conquering career milestones like becoming a department head or XO, it may be best to do a PG school tour at a more strategic time (Active Officer Promotion Brief).

Another thing to consider is that it is important to screen for DH, XO, and CO to have the best opportunity for promotion; so administrative screening boards held by the community analyze officer records in many ways to determine who gets to take the most competitive jobs. Always taking and excelling in the recognized hard jobs is the best way to ensure competitiveness for promotion (Active Officer Promotion Brief).

For example, the O-4 promotion board selects approximately 80% of the qualified officers for promotion with a variation of plus or minus 10%, depending on the officer community. Since the SWO inventory gap at the midgrade and senior levels is larger than the others, SWO promotion rates are much higher than the rates established by the DoD. Table 10 exhibits SWO promotion rates (for both conventional and nuclear-qualified SWOs) to lieutenant commander (O-4) for FY 2003 through FY 2008. Table 11 shows similar SWO promotion rates to commander (O-5), and Table 12 shows comparable SWO promotion rates to captain (O-6). In tables 10, 11, and 12, for each promotion category (i.e., “above zone,” “in zone,” and “below zone”), the data are displayed as the number of SWOs eligible for promotion, the number of SWOs selected for promotion, and the overall percentage of SWOs selected for promotion (Carman, 2008).

Table 10. SWO Promotion Rates to Lieutenant Commander (O-4) for FY 2003 through FY 2008 (From: Carman, 2008)

Fiscal Year	Lieutenant Commander (O-4): 111X/116X								
	Above Zone			In Zone			Below Zone		
	Elg	Sel	%	Elg	Sel	%	Elg	Sel	%
FY03	16	0	0.00%	217	203	93.55 %	615	7	1.14 %
FY04	21	0	0.00%	241	202	83.82 %	525	17	3.24 %
FY05	40	3	7.50%	249	221	88.76 %	501	4	0.80 %
FY06	33	1	3.03%	239	208	87.03 %	686	5	0.73 %
FY07	31	10	32.26%	260	229	88.08 %	564	13	2.30 %
FY08	22	3	13.64%	277	234	84.48 %	530	0	0.00 %

Table 11. SWO Promotion Rates to Commander (O-5) for FY 2003 through FY 2008 (From: Carman, 2008)

Commander (O-5): 111X									
Fiscal Year	Above Zone			In Zone			Below Zone		
	Elg	Sel	%	Elg	Sel	%	Elg	Sel	%
FY03	182	15	8.24%	175	123	70.29%	312	1	0.32 %
FY04	169	3	1.78%	153	113	73.86 %	294	3	1.02 %
FY05	160	10	6.25%	128	98	76.56 %	349	0	0.00 %
FY06	150	5	3.33%	118	82	69.49 %	313	6	1.92 %
FY07	135	2	1.48%	146	108	73.97 %	311	0	0.00 %
FY08	140	9	6.43%	154	114	74.03 %	381	0	0.00 %

Table 12. SWO Promotion Rates to Captain (O-6) for FY 2003 through FY 2008 (From: Carman, 2008)

Captain (O-6): 111X									
Fiscal Year	Above Zone			In Zone			Below Zone		
	Elg	Sel	%	Elg	Sel	%	Elg	Sel	%
FY03	147	0	0.00%	102	55	53.92 %	267	8	3.00 %
FY04	157	3	1.91%	112	52	46.43 %	280	6	2.14 %
FY05	149	2	1.34%	122	64	52.46 %	271	2	0.74 %
FY06	165	0	0.00%	92	42	45.65 %	243	2	0.82 %
FY07	164	3	1.83%	112	64	57.14 %	249	0	0.00 %
FY08	141	0	0.00%	134	80	59.70 %	253	0	0.00 %

Table 10 indicates that the past six lieutenant-commander (O-4) board promotion rates for SWOs were above the DoD standard of 80% promotion probability (found in Figure 24). Similarly, as illustrated in Table 11, in five of the past six fiscal years, commander (O-5) SWO board selection rates were above the DoD-standard 70% O-5 promotion opportunity. As shown in Table 12, results varied for captain (O-6) promotion board statistics. While some fiscal-year boards selected above the DoD standard 50% O-6 promotion opportunity, in other years the rate fell below the standard promotion rate (Carman, 2008).

According to a CNA (2008), the rates of screening for command and promotion to flag officer in the SWO community vary by commissioning source. The SWO community has the most distinct pattern of percentages of screening for command. Table 13 shows that USNA and NROTC graduates have similar probabilities of first screening for command, 27.2% and 24.4% respectively, while OCS graduates have a lower probability (12.1%). USNA accessions who stay to YCS 15–16 are more than twice as likely to screen for command as their OCS counterparts, and slightly more likely than their NROTC counterparts. Overall, for the combined URL communities, USNA appears to have the highest percentage of accessions screening for command among those who stay to that career milestone, although the rate for NROTC accessions is similar. In contrast, the rate for OCS accessions is noticeably lower (CNA, 2008).

Table 13. SWO Screen for Command by Accession Source (From CNA,2008)

Accession source	Number of officers with YCS 15–16, sum of Sep inventories 1996–2003	First screened for command, FY 1997–04*	First screen for command (percentage)	Avg. number screened per year
USNA	896	244	27.2	31
NROTC	1,071	261	24.4	33
OCS	1,466	177	12.1	22

*LCDR/CDR only

Table 14 exhibits that, in the SWO community, NROTC accessions have an average rate of promotion to flag rank that is roughly twice that of their OCS counterparts (2.1% versus 1.5%, respectively), and the NROTC accessions have an average rate that is midway between the USNA rate (2.7%) and the OCS rate. USNA graduates have the highest promotion rate to flag officer among the other sources (CNA, 2008).

Table 14. SWO Promotion to Flag Officer (From CNA, 2008).

Accession source	Number of O-6 officers with YCS 23 or more, sum of Sep inventories 1994-2004	Promotion to flag in following 12 months (number)	Promotion to flag in following 12 months (%)	Avg number promoted per year
USNA	1,617	44	2.7	4.0
NROTC	1,268	26	2.1	2.4
OCS	935	17	1.5	1.5

As the previous tables show, USNA accessions usually have higher rates of screening for command and for promoting to flag rank than accessions from other sources, particularly those from OCS. This result suggests that, if a relatively small number of additional accessions were needed on an ongoing basis (e.g., not a temporary increase in accessions), there might be an advantage in increasing the number of USNA accessions, assuming they perform similarly to, past USNA accessions.

3. Promotion-Board Process

According to the Active Officer Promotion Brief, there are two types of boards: statutory and administrative. Statutory boards contain promotion (including special and spot promotion boards), selective early-retirement boards (SERB), and various continuation boards. All other boards are administrative. A statutory URL board consists of the following officers (Active Officer Promotion Brief):

- five aviators (at least one 1320)
- three surface
- one special warfare (1130)
- one special operations (1140)
- three submarine
- one joint representative
- one acquisition professional
- minority/female reps
- one USNR

The mission of any board is to select those officers that are best qualified, based on performance. Additional guidance in the precept addresses specific guidance for the board to consider in selecting the best-qualified officers. According to Rogers and Grose (2003), the process can be broken down into three sections:

- a. pre-board
- b. record review
- c. selection

a. *The Pre-Board Phase*

All preparations begin four months before the board meeting date and are done in this phase. The list of eligible officers is frequently checked with an official automated database to avoid any problems. Researching and correcting those problems and inconsistencies is carried out in the “prep week” or “board-recorder week” (Rogers & Grose, 2003).

b. *The Records Review Phase*

The voting members of the board share all the eligible officers’ records among them for review. Board members use an information system called the Electronic Military Personnel Records System (EMPRS) to review a candidate’s record. In a nutshell, the board members evaluate all pertinent data on their assigned candidates via an EMPRS terminal (Rogers & Grose, 2003).

c. *The Selection Phase*

Having completed the records-review phase, the board passes to the next step: the selection phase. In this phase, the board members assemble in a room called “the tank” which is a private, theater-like room where all the members discuss and vote on candidates. Several tank sessions are usually required before the board selects the final candidates they believe best qualified for promotion. Finally, the board completes its considerations and votes to approve the tentative selections. (Rogers and Grose, 2003)

4. Promotion as a Measure of Performance

Since promotion to a higher rank assumes increased responsibility and qualification for higher-level job assignments, the SWO promotion system basically aims to promote the most qualified officers to ensure a good person–job fit. In this system, promotion plays two important roles. On the one hand, it tries to ensure a good person–job fit based on ability; on the other hand, it makes officers increase their performance to be promoted (Fairburn and Malcomson, 2001). Theoretically, officers who do not have the required qualifications for the next rank cannot be selected for promotion. However, since promotion opportunities at midgrade promotion boards are significantly higher,

with a promotion opportunity of up to 90%, and the eligible pool for promotion is larger than other boards, there is a possibility that some officers who are not ready to accept the responsibility of higher rank may be selected nevertheless (Yardley et al., 2005). According to Carman (2008), the surface warfare community is more exposed to this scenario, because the SWO inventory gap is larger than that of other communities at the midgrade and senior ranks. For example, suppose that an annual O-4 board considered a hundred SWOs for promotion and only seventy-five of them have the qualifications required to successfully perform the duties of a lieutenant commander (O-4). Because of the inventory gap in the SWO community at the O-4 level, the board precept offered selecting 90% of eligible officers. Most probably, although the fitness to perform the increased responsibility associated with the promotion is questionable in the case of fifteen officers, the promotion board would take into account the precept guidance and select ninety SWOs for promotion. This can be troublesome for the SWO community, as more highly qualified SWOs leave the Navy at earlier ports of exit. Therefore, in order to meet personnel requirements, lower-quality officers may promote. However, since the promotion opportunity significantly decreases as the rank becomes more senior, the possibility of this phenomenon decreases in higher promotion boards (Carman, 2008).

Carman (2008) states that although SWO performance is not monetarily rewarded, their performance is evaluated and rewarded during promotion boards. When they promote to a higher rank, they get higher pay and receive an increase in allowance. Promotion boards take into account advanced education, training, professional surface warfare qualifications, the challenge and visibility of past job assignments, Joint Professional Military Education (JPME), joint experience, and personal awards as a measure of performance. Both past performance and potential ability to perform future assignments at a higher pay grade are considered. Therefore, it can be concluded that promotions may be a good proxy for performance among SWOs (Carman, 2008).

When the NPRST retention poll was carried out, some questions about the promotion system were asked to garner opinions as to the advancement/promotion system in the Navy. The question below was asked and results are exhibited in Figures 26 and 27.

Figure 26 displays that while 86% of officers have a clear understanding of the promotion system, only 56% are satisfied with it. 42% believe that the most qualified and deserving sailors receive promotion.

Q17. How much do you AGREE or DISAGREE with the following statements regarding advancement/promotions?

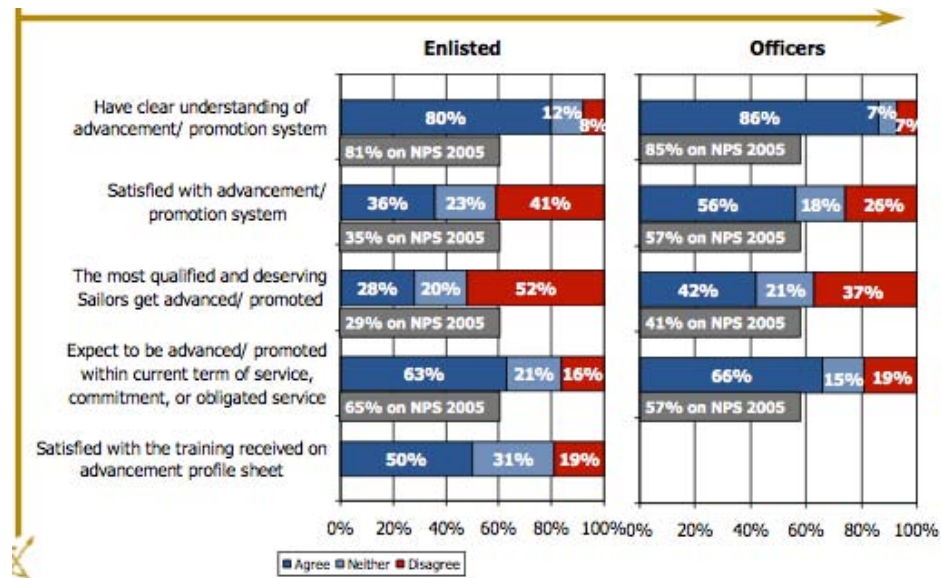


Figure 26. Advancement/Promotion (From: NPRST Retention “Quick Poll”)

Figure 27 exhibits that while 57% of senior officers are satisfied with the promotion system, this figure falls to 55% for junior officers.

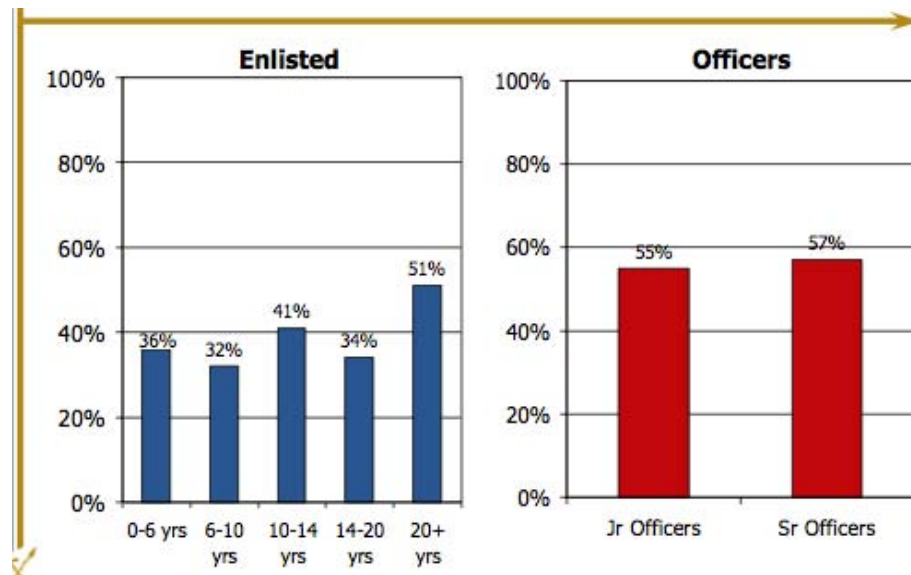


Figure 27. Satisfied With Navy Advancement/Promotion System by Years of Service (From: NPRST Retention “Quick Poll”)

F. PREVIOUS STUDIES

1. Study by Ergun (March, 2003)

a. Model and descriptive statistics

Ergun (2003) argues that the main difference between accession sources is the time that graduates are exposed to military culture and training. USNA graduates receive the longest exposure, followed by Naval Reserve Officer Training Course and Officer Candidate Course graduates.

Ergun uses data from the Marine Corps Commissioned Officer Accession Career (MCCOC) data file and merges it with fitness-report files. The data includes 28,058 observations from cohorts FY 1980 through FY 1999. He examines the effect of seven accession programs on five different performance measures, which include performance at the Basic School (TBS); retention to ten years of service; promotion to O-4 and O-5; and a performance index based on officer-fitness reports.

In “TBS performance model,” he examines four performance measures as dependent variables. These measures are overall class-standing percentiles; academic class-standing percentiles; military class-standing percentiles; and leadership class-

standing percentiles. Overall class standing includes academic, military, and leadership standings. He utilizes a percentile method to control for cohort size differences.

In the ten years of commissioned service model, the dependent variable is a dichotomous variable which shows whether a service member survived in service until ten years. The promotion to O-4 and O-5 model utilizes a two-stage probit regression technique. In the first stage, Ergun examines whether the service member survived until his respective (O4 or O5) promotion board, and in the second stage, whether he got promoted. In the performance-index model, he examines FITREPs of service members. Since there is more than one FITREP for each grade, he computes average scores and converts them to a one-hundred scale for all grades.

For all models, Ergun groups independent variables in three ways: personal characteristics, cognitive human capital, and affective skills. He also uses TBS performance as an independent variable for the other performance models. Personal characteristics consist of sex, race, and marital status. Cognitive human capital consists of General Classification Test (GCT) scores and TBS performance, while affective traits consist of occupational specialty, prior enlisted service, commissioning source, duty type being reported in FITREPs, and qualification for promotion. He also includes fiscal year dummies as proxies to control for other effects.

In the TBS performance models, Ergun finds that graduates of three enlisted commissioning programs—the Marine Corps Enlisted Commissioning Program (MECEP), Meritorious Commissioning Program (MCP), and the Enlisted Commissioning Program (ECP)—have the highest percentile scores at TBS. NROTC and USNA constitute the middle group while OCC and platoon-leader course (PLC) members receive the lowest scores.

In the retention to 10 YCS model, he finds that the commissioning source is a significant predictor of retention. For all cohorts, the mean retention rate is 55%. However 86% of MECEP graduates and 73% of ECP graduates survive to ten years. USNA, NROTC, and PLC follow these with retention rates between 54% and 56%. OCC graduates have the lowest retention rate at 50%.

In the promotion to O-4 model, Ergun finds that the overall promotion rate is 0.735. Unlike previous models, this model shows just small differences between commissioning sources, varying between 0.711 and 0.771; but they are significant.

Overall mean promotion to O-5 is 0.676, but there are significant differences between commissioning programs. USNA and NROTC have the highest promotion rates at 0.75 and 0.72, respectively, about five points higher than PLC.

The performance index results (based on FITREPs) show that MECEP and MCP graduates are top performers for grades O-1 through O-3, and USNA and NROTC graduates have the best performance FITREPs results for O-4. Although this is the case for all cohorts, the study implies that there is an inflation of fitness-report scores before 1999, the year when the Marine Corps introduced the new performance index. Although limited by data size, t-tests show that there was no significant difference between PI grades between 1999 and 2000, after the introduction of the new reporting system.

b. Results

After finding statistically significant differences among commissioning sources in descriptive statistics, Ergun estimates various multivariate models. Among other performance measures, we focus especially on promotion and retention results.

Taking USNA graduates as the baseline category, the study finds that officers from MECEP have 15 percentage points higher retention rates. Adding another 6.7 points for having prior enlisted service brings the MECEP retention rate to .86. OCC and PLC graduates have 10.5 and 3.9 percentage point lower retention rates, respectively, compared to USNA graduates. Marriage and age at commissioning are two significant variables that increase retention by 7.7-percentage and 1.95 percentage points, respectively.

Looking at promotion to O-4, Ergun utilizes a two-stage probit model. Being a MECEP graduate turns out to be insignificant, while other sources positively increase promotion compared to USNA. Having prior enlisted-service experience is also insignificant. He also finds that being married or female positively affects promotion.

Thanks to the two-stage bivariate model, he discovers that those who couldn't survive until O-4 promotion board most probably wouldn't have promoted anyway.

Lastly, in the promotion to O-5 model, among commissioning sources, only MECEP and ECP are significant in having 21.1 and 25 percentage point positive effects, respectively. But taking prior enlisted service into account, which has a -27.5 percentage-point negative promotion difference, MECEP's positive effect decreases dramatically. NROTC and PLC members also have higher promotion rates than USNA graduates. One last significant variable is TBS class rank, which increases promotion. Table 15 presents overall logit regression results and shows only those variables in focus for our study.

Table 15. Overall results for retention and promotion (From Ergun, 2003)

	Retention to 10-year (%Perc.Points)	O-4 Promotion (%Perc.Points)	O-5 Promotion (%Perc.Points)
USNA (Base case)			
NROTC	N.S	7.5***	9.4***
PLC	-3.9**	10.0***	6.3***
OCC	-10.5**	13.9***	N.S
MECEP	15.0***	N.S	21.1***
ECP	N.S	9.1***	25.0***
Prior Enlisted	6.7***	N.S	-27.5***

** Significant at the 0.05 level; *** Significance at the 0.01 level; Perc.Points: Percentage Points; N.S.: Not Significant

Ergun does not include an age variable in his study, which is a common variable in previous studies. The reason for this exclusion is because age is highly correlated with the prior-enlisted variable. Service members with prior enlisted

experience are three- to four years older than other (especially USNA) graduates. This is also true for our data, in which USNA graduates demonstrate the most condensed age distribution, averaging about 22.

2. Study by Bernard (2002)

Bernard (2002) analyzes the effect of commissioning sources on promotion and retention for U.S. Navy officers. He also utilizes lifecycle-cost techniques to find out which commissioning source is more cost effective, assuming a steady-state force structure. He examines whether an officer survives until O-4 promotion board and then if he is promoted.

Bernard states that lateral transfer into the SWO community negatively effects O-4 promotions. That is credited to the absence of ship experience, which is vital for the SWO career path. The data does not allow further investigation because there is no date information on when the lateral transfers occurred. If it does not occur too late to affect a particular career, there might be a chance to acquire experience for officers who transfer into the SWO community.

Bernard also argues that most prior studies use survival rates alone as a performance measure. This is a weakness, because there are innumerable reasons for an officer to leave the Navy, and without understating these underlying reasons, it is difficult to adopt performance measures. Officers who leave before the O-4 promotion board may leave either voluntarily or involuntarily. One of the biggest reasons for involuntary separations was the Navy personnel drawdown policy in the early 1990s. The results would be biased if the reason of separation for these officers were not dealt with explicitly.

Bernard uses data from the Navy Officer Data Card. The data includes restricted and unrestricted line officers from years through 1983 through 1990, which is merged with data from promotion board results from the years 1986 through 2001. Observations with missing information are dropped and the sample is limited to those between twenty and thirty years of age. Although dropping observations with missing values may cause

bias in the results, Bernard deletes 2,934 observations (15% of total sample) due to their omission of academic background. That leaves 17,134 URL and 5,129 restricted line observations.

Referencing Bowman (1995) Bernard suspects that examining commissioning sources as a whole may cause an aggregation bias. This bias implies that not examining each community separately may hide a community's particular effect by aggregating it with other communities. He thus divides data into three URL communities (surface, submarine, and aviation) and one restricted-line group.

a. Model

Bernard chooses dependent variables based on whether an officer survived to the O-4 promotion board for the retention model and whether he was promoted to O-4 for the promotion model. Independent variables consist of demographics, human capital, college selectivity, community designator, and control variables for years.

The sources of commission are USNA, ROTC-scholarship, ROTC-contract, OCS, and ECP. Three "college selectivity" variables control the academic background of the officers. He uses Barron's *Profiles of American Colleges* publication to classify undergraduate educations into three tiers: most selective, moderately selective, and least selective. The study also includes variables for lateral transfers, which was not analyzed in previous studies. He hypothesizes that being transferred into another community may indicate dissatisfaction with the initial community, which should have a positive effect on performance.

b. Results

The retention model consists of two results. The basic model finds that ROTC-scholarship and OCS graduates are less likely to stay up to O-4 board than USNA graduates. On the other hand, ROTC-contract and ECP graduates have the same retention rates of USNA graduates. Having technical degrees, prior enlisted service, or being male are other variables that positively affect retention. There is no significant difference

between black and white officers, but other races are less likely to stay than whites. Also, officers that are married or single with children are more likely to stay than those who are single without children.

The second retention model is similar to the first, except that it includes variables for warfare communities and college selectivity, hoping to control for college quality among accession sources. Bernard finds that non-selective ROTC-scholarship and ROTC-contract graduates are more likely to stay than USNA officers, while non-selective OCS graduates are less likely to stay. Looking at net retention rates for each accession source after grouping same-quality colleges, ROTC-scholarship and OCS graduates have a lower probability of staying by 15.6% and 9.4% respectively. The other effect of controlling for college selectivity makes the "black" variable significant and shows that black officers are 9.6% more likely to stay.

The promotion model implements the same logit model techniques as the retention model. Bernard finds that ROTC-scholarship graduates are 8.1% less likely to promote than USNA graduates.

The promotion model for the SWO community reveals that ROTC scholarship and OCS graduates are less likely to be promoted than USNA graduates. Having a technical major increases the promotion probability by 3.3%. Having prior service and being black are not significant in the model, whereas other race officers are 8.6% less likely to promote to O-4. Also, surprisingly, neither sex nor marital status is significant. After rerunning the same model and adding the college selectivity variable, he finds that ROTC-scholarship and OCS graduates from highly selective colleges have a higher probability of promotion than USNA graduates.

3. Study by Bowman and Mehay (1999)

a. Model

Bowman and Mehay (1999) examine the effects of graduate education on the job performance of Navy officers, using promotion to O-4 as a performance measure. They obtained data from the Navy's Promotion History File, which covers officers that were reviewed by promotion boards between 1985 and 1990. This file was merged with

fitness-report information on the officers in question. Bowman and Mehay separated the subjects into line and staff officers, due to their different community structures and evaluation characteristics.

The model they use separates human capital into two components: cognition and affective skills. Affective skills consist of, but are not limited to, perseverance, self-discipline, leadership, initiative, and ability to cooperate. Since these are mostly work-related attitudes, the researchers believe that commissioning sources are good instrumental variables for them. They also include variables for cognitive abilities like college grade-point average and whether the officer has a technical major or not.

b. Results

Descriptive statistics show that the promotion rates for officers with a master's degree and without are 0.41 and 0.37, respectively (for USNA graduates). Promotion rates for master's degree/no degree are 0.27/0.30 for ROTC, 0.25/0.26 for OCS and 0.07/0.07 for NESEP. Having a master's degree in USNA is relatively more helpful than it is for other commissioning sources. This small difference is attributed to the academic background of officers that made them eligible for higher education.

In all models, they conclude that USNA graduates are more likely to promote than other commissioning sources. This is attributed to their greater human capital, which is in more in line with Navy requirements. Other factors that positively contribute to promotion rates are being younger, female, and married.

4. Study by Parcell et al. (2003)

This study was conducted to determine factors that affect Navy officers' careers that can be observed at the commissioning date. They investigate whether commissioning source and other factors (e.g. undergraduate education) have any effect on the success.

a. Model

The performance measures used are promotion to O-3, O-4, O-5, and O-6. Regression analysis techniques are implemented to examine cohorts commissioned from FY 1976 through FY 1996. They examined the three largest communities separately: aviation, surface warfare, and submarine.

Table 16 shows average promotion rates for SWOs. USNA graduates have higher promotion rates than other sources. One thing to note, though, is that the figures in the table are calculated based on promotion-board results. The rates do not account for officers who left between any two promotion points, which yields a biased picture of true promotion rates.

Table 16. SWO promotion rates (From Parcell, 2003)

	USNA	NROTC	OCS	Others	Total
O3	0.96	0.90	0.85	0.92	0.92
O4	0.89	0.82	0.78	0.79	0.84
O5	0.86	0.81	0.76	NA	0.83
O6	0.58	0.43	0.32	NA	0.53

The study uses *Peterson's Guide* to determine college selectivity and creates variables for historically black college or universities and Hispanic-serving institutions. They also included demographic variables and year dummies.

b. Results

The study finds that commissioning sources affect promotion in the early stages of an officer's career. OCS graduates had the lowest promotion rates to O-3. USNA, on the other hand, is the most successful, despite its higher cost. Parcell et al., also highlight that higher undergraduate grades are associated with higher promotion rates. The result does not mean that higher grades have a causal effect on performance. Rather, it may be that other attributes, e.g. ability, time-management skills, organizational skills, and attention to detail, are correlated with both success in school and work. One interesting finding was that black officers who attended historically black college or

universities were less likely to be promoted in the surface warfare community, holding other factors fixed. This was not the case for the other communities.

The promotion to O-4 model found that USNA, NROTC, OCS and enlisted-to-officer programs have almost the same effect on promotion rates, given that officers survived to eleven years of service. On the other hand, college grades were a more important predictor than in the O-3 model. Above-average grade points increased the probability of promotion by 4%, whereas below-average grades decreased the probability by 5%. Other factors contributing to promotion positively were being female and married.

5. Summary

Many studies have found that commissioning source has a substantial effect on retention and promotion. Since every study uses a different methodology and selected sample, their results differ. These differences could also be due to the fact that over time, Navy personnel policies have changed. This study will add to this literature findings from more recent cohorts.

G. CHAPTER SUMMARY

Throughout history, officers have been the backbone and a key component of the armed forces for all nations. The overall quality of a nation's military is highly dependent to the quality of its officers. Every military wants to recruit and retain the best individuals for its officer corps. Attracting and keeping high-quality personnel has been a challenge for the armed forces. The U.S. Navy spends hundreds of millions of dollars annually to educate and train candidates for commissioning as officers. The United States Naval Academy, the Naval Reserve Officers Training Corps, Officer Candidate School, and enlisted-to-officer commissioning programs are major commissioning sources of surface warfare officers (Korkmaz, 2005).

Retention is defined as the voluntary decision of officers to stay in the military after their MSR. The services set annual goals for retention to meet the required number of officers to carry out their missions. Since manning shortages can cause great troubles

within the military personnel system, military services watchfully track officer retention. On one hand, if too few officers are retained, the military would face problems from a lack of experienced leaders and decreased efficiency; on the other hand, the retention of too many officers would decrease promotion opportunities and cause many officers to leave involuntary. Unlike nearly all other organizations, the DoD relies completely on its own manpower, and higher-ranking members must be retained and promoted from lower ranks, as the military services have a closed personnel system. While most other organizations can and do hire from the outside at all levels, the DoD has to obtain required personnel from its own closed system by accession and promotion through all levels. Therefore, if the military services fail to meet recruiting or retention goals at lower levels in a given year, they will have significant problems in producing experienced leaders for subsequent years (GAO-Military Compensation, 2010). There are many factors affecting retention such as human-capital investments, compensation and the external economy, demographic and job-related factors, and commissioning sources.

The literature shows that an increase in compensation has a positive effect on retention among surface warfare officers. Additionally, investments in human capital significantly influence officers' decisions at the ports of exit. Demographic factors such as age, marital status, race, gender, dependent status, and educational background also affect stay-or-leave decisions. Studies show that deployment adversely affects retention and that there is strong correlation between high job satisfaction and retention. Job satisfaction strongly depends on job performance and leadership. Since job satisfaction, job performance, and leadership strongly relate to retention, they must not be ignored in any analysis of SWO retention.

The function of the naval promotion system is to choose the required number of desired quality officers to implement its missions. In order to accomplish this goal, the Navy promotes an adequate number of officers as openings occur. An impartial and effective promotion system enables the Navy to sustain the strength in each grade and ensures retaining a highly qualified and motivated officer force by providing reasonably

consistent and visible progression patterns for all competitive categories. Promotions through lieutenant (O-3) are based solely on meeting minimum requirements and qualifications, whereas promotion to lieutenant commander (O-4) and more senior pay grades relies on the judgment of formalized promotion boards.

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III. PRELIMINARY DATA ANALYSIS

A. DATA DESCRIPTION

The data for this analysis is obtained from the Officer Master File (OMF) via the Navy Econometric Modeling (NEM) online data system. It contains 10,295 observations. All observations include surface warfare officers between fiscal years 1994 through 2009. Observations after fiscal year 2004 were dropped from data because these officers were still to reach the O-4 career point at the time this study was conducted. Variables that are used in the model are explained in detail in the following section.

B. VARIABLES

1. Performance Measures

Performance measures are dichotomous dependent variables that indicate whether an individual achieved a particular goal or not. For the retention model, this dependent variable is “Stay.” It takes a value of 1 if the individual survives up to the O-4 promotion board and 0 if he left the Navy before that point. For the promotion model, the dependent variable is “promote.” It takes a value of 1 if the individual promotes to O-4 and 0 otherwise.

Table 17 depicts retention and promotion rates by commissioning sources. Note that these numbers are derived only from officers who were promoted to O-3. Officers who left before the O-3 promotion point are omitted from the rest of the analysis. The first column in the “Retention” panel shows the number of officers who promoted to O-3. The second column represents the proportion of officers who stayed in service until the O-4 promotion board. Similarly, in the “Promotion” panel, the first column indicates the number of officers who stayed until the O-4 promotion board. The second column indicates the proportion of officers who received promotion to O-4. The retention numbers are highest for NROTC-regular and USNA (N in promotion), followed by OCS. However, promotion rates (the mean for promotion) are highest for OCS and NROTC-contracts, followed by other sources. The total number shows that out of 7,262 officers

promoted to O-3, 3,236 stayed in service until the O-4 promotion board. In addition, the promotion rate to O-4 for these “stayers” is 58.59%.

Table 17. Retention and Promotion Rates by Commissioning Sources

Commissioning Source	Retention			Promotion		
	N	Mean	SD	N	Mean	SD
USNA	2,630	0.523	0.5	966	0.535	0.499
NROTC Regular	2,297	0.605	0.489	1,007	0.49	0.5
NROTC Contract	256	0.641	0.481	118	0.754	0.432
OCS	1,230	0.745	0.436	665	0.786	0.41
Other	849	0.677	0.468	480	0.571	0.495
TOTAL	7,262	0.6087	0.488	3236	0.5859	0.4926

2. Commissioning Sources

Commissioning sources are broken down into the following categories: “USNA,” “NROTC-regular,” “NROTC-contract,” “OCS,” and “other sources.” USNA, NROTC-regular, and NROTC-contract represent the graduates from their respective sources. OCSs consist of graduates from Officer Candidate School and Naval Officer Candidate. Other sources are few in graduate numbers, and they are grouped in the “other sources” variable. These sources include, but not limited to, the USN Integration Program, commissioning directly from the Air Force Academy, and from USA commissioned status. Figure 28 shows the distribution of graduates from each commissioning source over fiscal years. It is expected that USNA and NROTC-regular graduates are more likely to survive in service up to the O-4 promotion board. But this affiliation has less effect on promotion to O-4.

As shown in Figure 28, there is a relative increase in the number of OCS graduates between the years 2001 and 2004. That can be an effect of policy change by the Navy in an effort to respond quickly to “Global War on Terrorism” (GWOT) needs. In addition, graduates from “other sources” were in large numbers during 1997 and 1999 for this ten-year term.

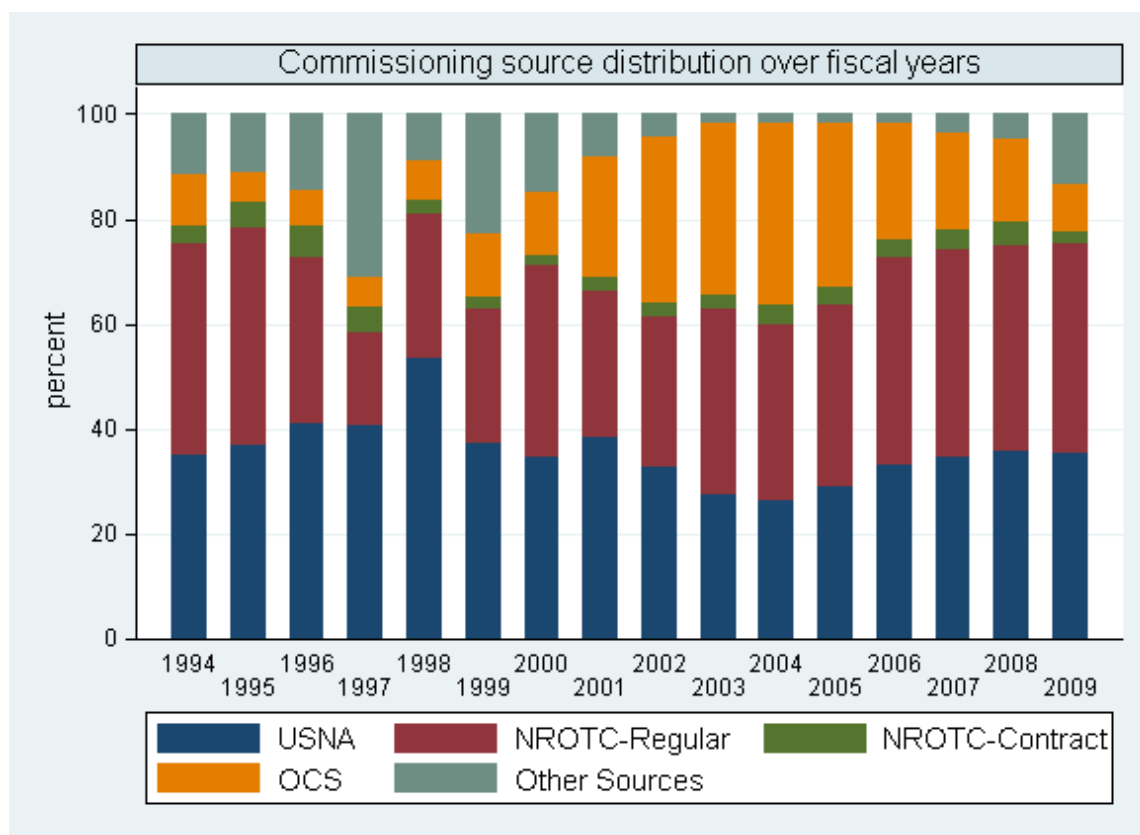


Figure 28. Commissioning Source Distribution Over Fiscal Years

3. Marital Status

Officers are divided into four groups according to their marital status: single without children, single with children, married without children, and married with children. We are expecting that married officers will be better performers. Prior studies have found evidence of a “marriage premium” (Bowman and Mehay, 1999). Also, officers with children are expected to perform better, as they are probably more risk averse and feel more devoted to their families. This precludes them from quitting the service and venturing to new jobs.

As shown in the Figure 29, the rates of personnel that have children, either single or married, are relatively stable over the years. There is an increase in the rate of childless singles between 2000 and 2003. The reverse effect is true for married officers without children in the same period.

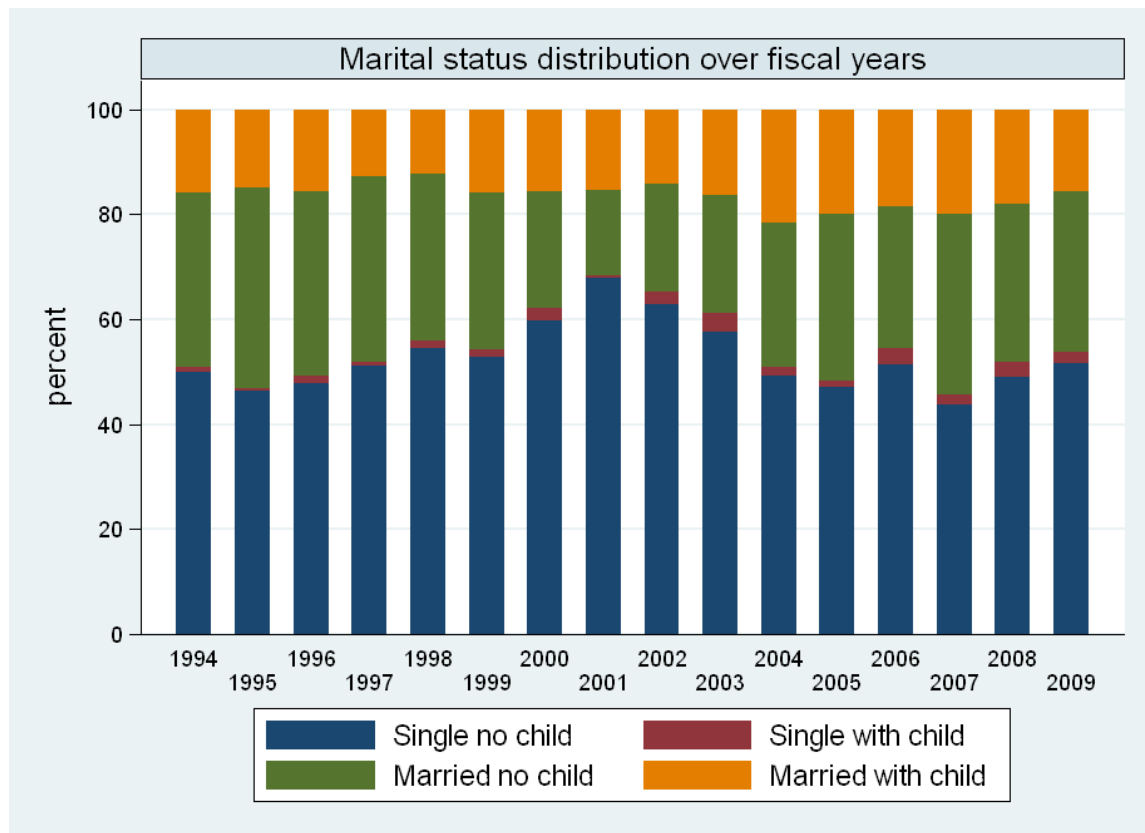


Figure 29. Marital Status Distribution Over Fiscal Years

4. Race

Four different categories for race are included in the model: white, black, Asian, and other races. Racial distribution is shown in Figure 30 over time and appears relatively stable among the races. Based on prior studies, we expect to find that nonwhite officers will have a lower probability than whites in retention to O-4, but promotion rates will be higher if they survived.

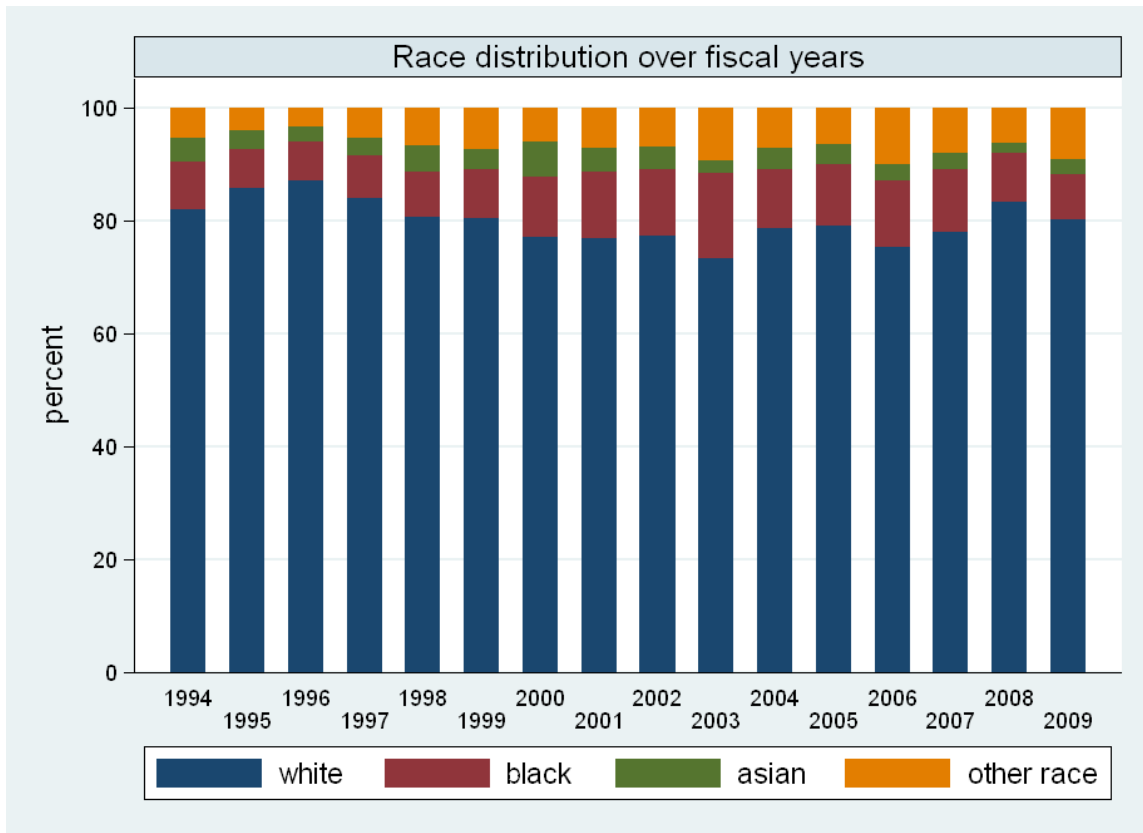


Figure 30. Race Distribution Over Fiscal Years

5. Gender

Gender is another variable that may affect retention and promotion. Based on previous studies, it is expected that females are less likely to stay until O-4, but those who do, will be more likely to promote. Figure 31 exhibits the male–female ratio over fiscal years. There is a conspicuous increase in the ratio of women after 1998. The average of female officers is 5% before 2000, but it increases to 20% on average after that.

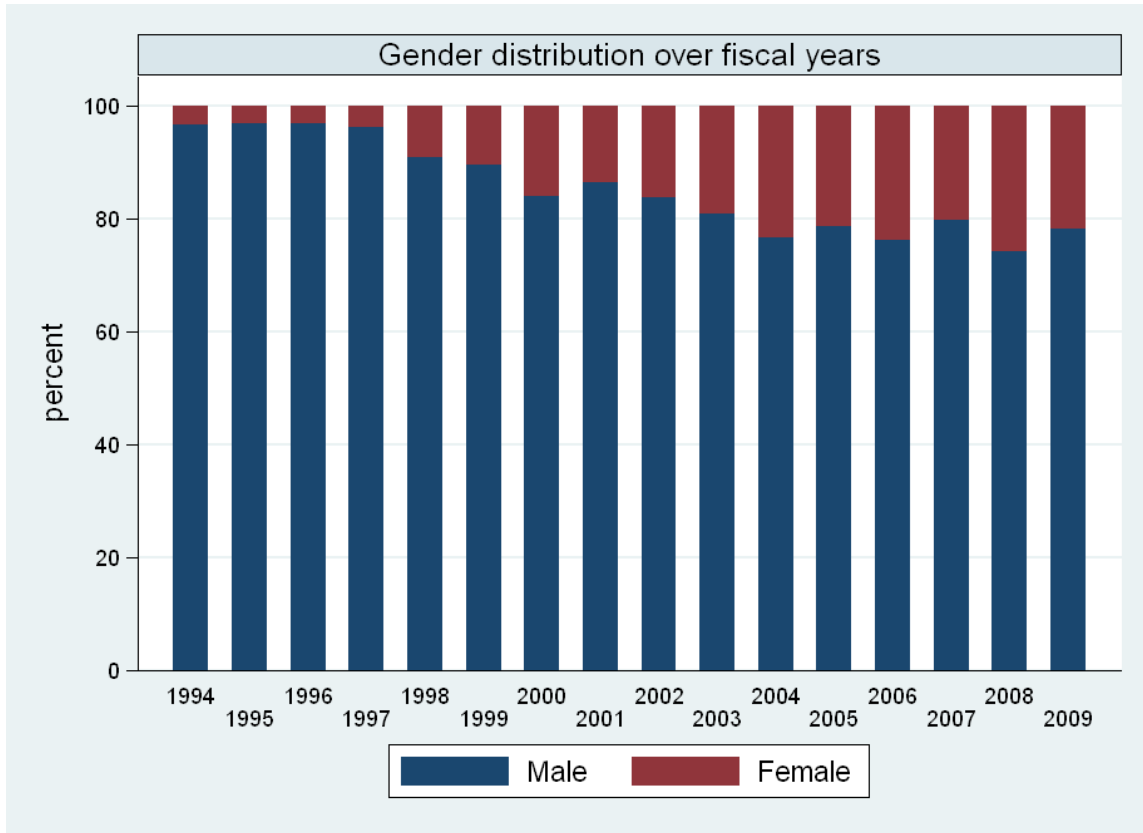


Figure 31. Gender Distribution Over Fiscal Years

6. Educational Level

Educational level is a good proxy for ability and other unobservable characteristics, such as motivation. The educational level of officers varies from less than two years of college to a master's degree. Individuals with missing educational-level information are also included in the model to mitigate any sample-selection bias, because we suspect that they may be systematically different from other officers. The Figure 32 shows educational-level distribution over time. There is an increase in the number of officers who either do not report their educational level or whose data is missing in the repository. The year 2005 is the year with the most missing data, with slightly over 40%. The number of officers who continue to higher education has been increasing since 2005.

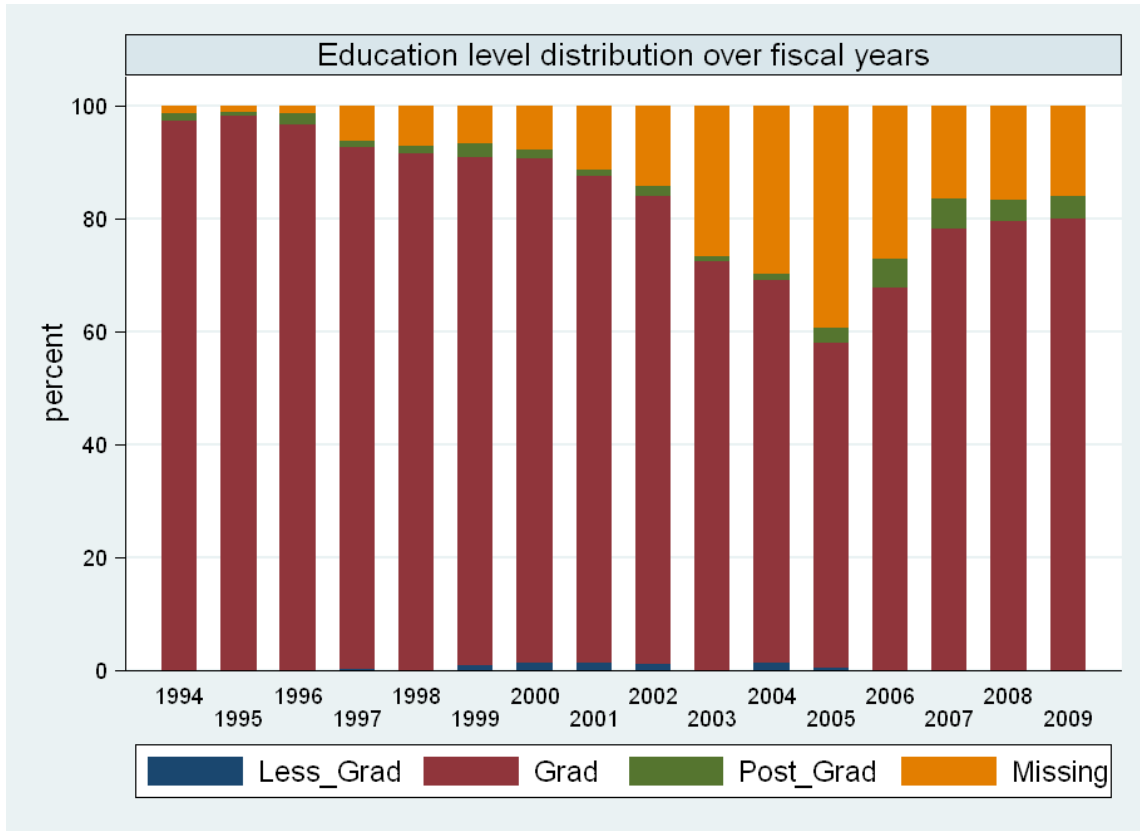


Figure 32. Education Level Distribution Over Fiscal Years

7. University Major

This variable represents officers' majors at a university or college. They are classified into five groups: life/health/medical sciences, physical sciences, engineering sciences, humanitarian sciences, and management/economics. Figure 33 shows the distribution of majors over commissioning sources. Among reported cases, there are 3,998 officers with technical majors and 4,729 non-technical. Between the years 1994 to 2009, human science and engineering majors were the most popular majors, with 2,915 and 2,655 officers respectively. Physical science and management/economics follow, with 1,304 and 1,050 officers, respectively.

It is assumed that while university majors have an effect on retention, they are exogenous to promotion. Majors are used in retention models, but not in the promotion models estimated below.

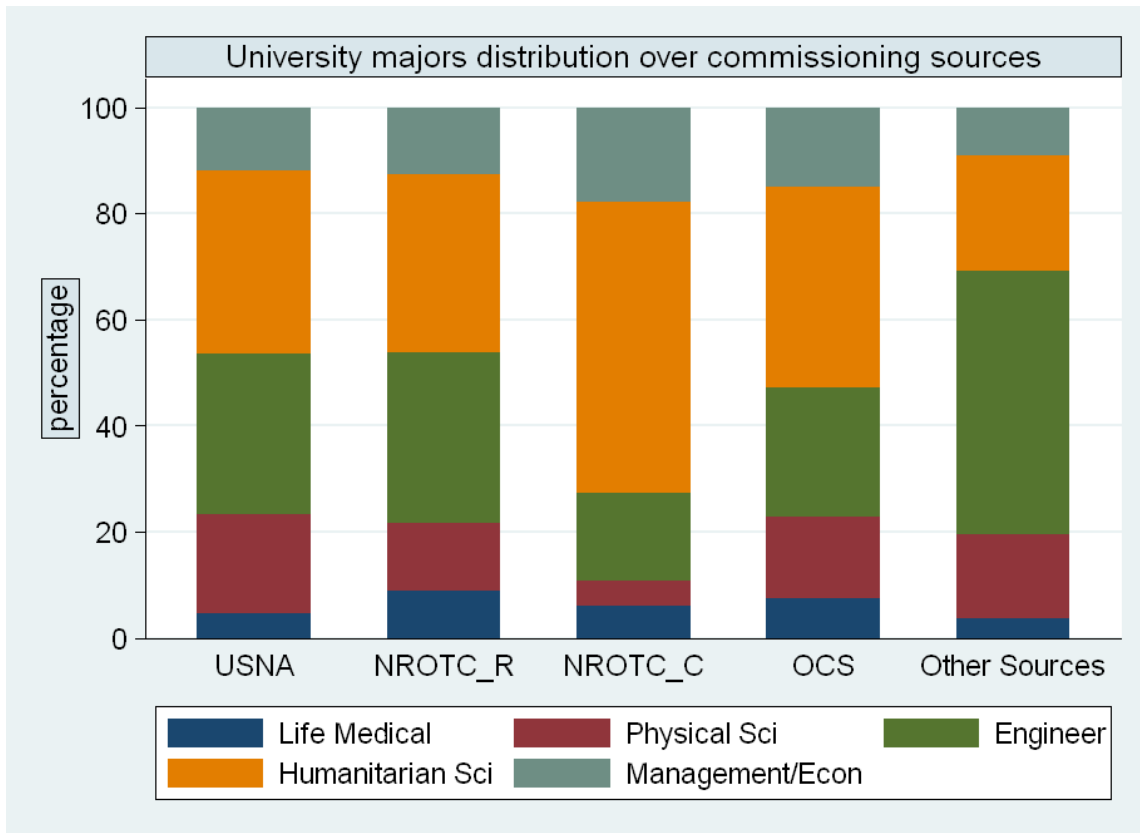


Figure 33. University Majors Distribution Over Fiscal Years

8. Prior Enlisted Service

It is assumed that having prior enlisted-service experience will contribute to both retention and promotion. These officers are better matches with military life, as indicated by their longer career in the military. In addition, this variable is highly correlated with age at commissioning. Thus, it is expected that its coefficient will be partly capturing the effect of age on retention and promotion. The older the officer, the more risk averse he is, in terms of job and profession change. That is why officers with prior enlisted service may be more likely to stay in the Navy.

OCS graduates are the largest number of officers with prior enlisted service, with 544 officers through 1994 to 2009. USNA, other sources, and NROTC-regular graduates follow it by 544, 225 and 164, respectively. There are only two officers with enlisted experience in the NROTC-contract.

9. Year Dummies

Year dummies are created out of “fiscal_year” variable in the original data. These dummies represent cohorts of officers that start to serve in the same year. This is the idea that Bowman and Mehay (1999) implemented. Dummies serve two goals. First, they control for cohort specifications that distinguish them from others, e.g. cohort size, current recruiting policy, etc. Secondly, they control for unobservable variables that cannot be fully controlled. Those unobservable variables may be economic conditions, job-market trends, unemployment figures, and short-term policy changes. The models will include dummies for years from 1994 to 2004.

10. Lateral Transfers

In the data set, there are some officers who transferred laterally to other communities. The data does not have a variable showing whether they got promoted after the lateral transfer or whether they left the Navy. Nor is there any information as to why they left the SWO community. Due to that lack of information, lateral transfers are not included in our models. Some key factors may be revealed if further investigations are implemented in future studies beyond this study’s scope. To enable a basic analysis here, descriptive statistics of the entire data sample and officers who laterally transferred are exhibited in Table 18. There are also t-test results for differences between the two groups. Note that this table includes years 1994 through 2004.

Table 18. Descriptive Statistics for Both All Sample and Only Lateral Transfers.

VARIABLES	Is Difference Significant ? (0.05)	WHOLE SAMPLE				LATERAL TRANSFEREES		
		N	mean	sd		N	mean	sd
white	Y	7,26 2	0.802	0.399		94 2	0.754	0.431
black	Y	7,26 2	0.0972	0.296		94 2	0.12	0.325
asian	Y	7,26 2	0.0377	0.191		94 2	0.051	0.22
other_race	N	7,26 2	0.0632	0.243		94 2	0.0754	0.264
female	Y	7,26 2	0.113	0.317		94 2	0.145	0.353
single_no_child	Y	6,80 4	0.543	0.498		89 2	0.493	0.5
single_with_child	N	6,80 4	0.0151	0.122		89 2	0.0179	0.133
married_no_child	N	6,80 4	0.287	0.452		89 2	0.306	0.461
married_with_child	N	6,80 4	0.155	0.362		89 2	0.183	0.387
Grad	Y	7,26 2	0.872	0.334		94 2	0.901	0.298
Post_Grad	N	7,26 2	0.014	0.118		94 2	0.0202	0.141
usna	N	7,26 2	0.362	0.481		94 2	0.373	0.484
nrotc_r	N	7,26 2	0.316	0.465		94 2	0.324	0.468
nrotc_c	N	7,26 2	0.0353	0.184		94 2	0.0329	0.178
ocs	N	7,26 2	0.169	0.375		94 2	0.183	0.387
other_src	Y	7,26 2	0.117	0.321		94 2	0.0881	0.284
prior_enlisted	Y	7,26 2	0.176	0.381		94 2	0.205	0.404
tech_maj	Y	7,26 2	0.429	0.495		94 2	0.49	0.5
health	N	6,23 7	0.0019 2	0.043 8		83 8	0	0
life_sci	N	6,23 7	0.062	0.241		83 8	0.0453	0.208
medic	N	6,23 7	0.0033 7	0.057 9		83 8	0.0011 9	0.034 5
phy_sci	Y	6,23	0.16	0.367		83	0.191	0.393

		7			8		
engr	Y	6,237	0.333	0.471	838	0.393	0.489
hum_sci	Y	6,237	0.328	0.469	838	0.292	0.455
mgt_econ	Y	6,237	0.112	0.315	838	0.0776	0.268

C. METHODOLOGY

The study uses multivariate-regression models for analysis of retention and promotion. Regression analysis is applied to estimate the impact of the explanatory variables on the dependent variable as they change (holding all the other variables constant). Two regression models are specified to find whether there is any relationship between commissioning source and job performance using retention and promotion as performance measures. In order to isolate the effect of commissioning source on retention or promotion, the study controls for other independent variables that represent personal demographics and professional background, in addition to the commissioning source variables.

The first retention model analyzes the effect of the commissioning source on retention decisions at the end of the minimum service requirement. The data includes variables for those who left after getting promotion to O-3. It also includes data on officers who appeared before the O-4 promotion board. “Leavers” were defined as those who promote to O-3 but did not appear at the O-4 promotion board. This is also used to code the “Stay” variable, which is the performance variable for retention models. The “Promote” variable takes value of one for those who promoted to O-4. Data includes officers who started the commissioning service between the years 1994 to 2004. Officers who graduated after 2004 were still to reach the O-4 promotion point at the time data were extracted. STATA software is used to estimate the models.

1. Theoretical Model

Since the purpose of the research is to estimate the probability of retention or promotion, probit models (PM) can be used. Probit models are designed for binary-

dependent variables that are bounded between zero and one. In this analysis, the binary-dependent variable takes the value of 1 if the person leaves; otherwise it takes the value of 0. The theoretical model is (Wooldridge, 2009, pp. 575–586):

$$\ln(y^{\hat{}})=b_0+b_1X_1+b_2X_2+...+b_iX_i+e_i$$

$$y^{\hat{}}=\text{predicted odds ratio}=(\text{Probability of event} / 1-\text{Probability of event})$$

$$\ln(y^{\hat{}})=\text{natural logarithm of the predicted odds ratio}$$

$$X_1, X_2,...,X_i=\text{explanatory variables}$$

$$b_0, b_1, b_2,...,b_i=\text{estimated coefficients of the independent variables}$$

$$e_i=\text{error term.}$$

Since the PM is nonlinear, the OLS estimation techniques cannot be applied. Therefore, the probit model utilizes maximum-likelihood estimation (MLE) to estimate the coefficients instead of OLS. Only the sign of the effect can be understood by the coefficients. While a positive coefficient leads to an increase, a negative coefficient causes decrease in the probability of the outcome. However, partial effects of changes in the independent variables on the probability of the outcome can be measured using the `dprobit` command in STATA.

Self-selection bias can be a concern in models of promotion to O-4 or higher. Since the officers who leave before reaching a promotion board are not a random sample of the original cohort, self-selection bias can be seen in the predictions. In another words, if the promotion probabilities of those who leave (had they stayed) are more than or less than those of officers who stay, then the promotion model suffers from self-selection bias. In order to overcome such a problem, we use Heckman's self-selection model. This model involves a two-step procedure in which the first step includes predicting the determinants of survival. The second step incorporates this prediction and adjusts the estimates to take into account the nonrandom selection of the regression sample. In the study, probit and Heckman's correction models are utilized to predict the effects of explanatory variables on retention and promotion.

2. Models

The probit model is utilized to predict the retention model, since expected outcome is dichotomous. The retention model uses the “Stay” variable as a dependent variable. Independent variables include those representing commissioning sources, gender, race, marital status, educational background, and prior enlisted service. Also, year dummies are included in the model to control for other unobservable characteristics of cohorts and socio-economical conditions.

$$\begin{aligned} \ln(\text{stay}) = & \beta_0 + \beta_1 \text{nrrotc_r} + \beta_2 \text{nrrotc_c} + \beta_3 \text{ocs} + \beta_4 \text{other_src} + \beta_5 \text{prior_enlisted} \\ & + \beta_6 \text{female} + \text{black} + \beta_8 \text{asian} + \beta_9 \text{other_race} + \\ & \beta_{10} \text{single_with_child} + \beta_{11} \text{married_no_child} + \beta_{12} \text{married_with_child} + \\ & \beta_{13} \text{post_grad} + \beta_{14} \text{life_medic_sci} + \beta_{15} \text{phy_sci} + \beta_{16} \text{hum_sci} + \beta_{17} \text{mgt_econ} + \\ & \beta_{17} \text{fiscal_years} + \varepsilon \end{aligned}$$

The promotion model initially utilizes probit regression to predict the probability of promotion to O-4. The dependent variable is “Promote” which is a binary variable. Independent variables are the same as for the retention models, with the exception of variables that represents university majors of officers. We assume that these variables are exogenous in the promotion model but should be included in the retention model. This hypothesis is also the basis for the Heckman sample-selection models.

$$\begin{aligned} \ln(\text{promote}) = & \beta_0 + \beta_1 \text{nrrotc_r} + \beta_2 \text{nrrotc_c} + \beta_3 \text{ocs} + \beta_4 \text{other_src} + \\ & \beta_5 \text{prior_enlisted} + \beta_6 \text{female} + \text{black} + \beta_8 \text{asian} + \beta_9 \text{other_race} + \\ & \beta_{10} \text{single_with_child} + \beta_{11} \text{married_no_child} + \beta_{12} \text{married_with_child} + \\ & \beta_{13} \text{post_grad} + \beta_{17} \text{fiscal_years} + \varepsilon \end{aligned}$$

The Heckman model is built on the hypothesis that officers who left before the O-4 promotion board may be different in their promotion probabilities from those who stayed. The model first estimates the likelihood of staying in service, then predicts the probability of promotion *as if* we had observed the entire sample before the promotion board. The “Promote” and “Stay” variables are two dichotomous variables for promotion and retention. Independent variables are same as simple probit models; the only

difference is that the retention model includes university majors, which are hypothesized to be endogenous for retention, but exogenous for the promotion model.

$$\begin{aligned} \ln(\text{promote}) = & \beta_0 + \beta_1 \text{nrotc_r} + \beta_2 \text{Nrotc_c} + \beta_3 \text{ocs} + \beta_4 \text{other_src} + \\ & \beta_5 \text{prior_enlisted} + \beta_6 \text{female} + \text{black} + \beta_8 \text{asian} + \beta_9 \text{other_race} + \\ & \beta_{10} \text{single_with_child} + \beta_{11} \text{married_no_child} + \beta_{12} \text{married_with_child} + \\ & \beta_{13} \text{post_grad} + \beta_{17} \text{fiscal_years} + \epsilon \quad \textbf{selection} \quad (\ln(\text{stay}) = \beta_0 + \beta_1 \text{nrotc_r} + \\ & \beta_2 \text{Nrotc_c} + \beta_3 \text{ocs} + \beta_4 \text{other_src} + \beta_5 \text{prior_enlisted} + \beta_6 \text{female} + \text{black} + \\ & \beta_8 \text{asian} + \beta_9 \text{other_race} + \beta_{10} \text{single_with_child} + \\ & \beta_{11} \text{married_no_child} + \beta_{12} \text{married_with_child} + \beta_{13} \text{post_grad} + \\ & \beta_{14} \text{life_medic_sci} + \beta_{15} \text{phy_sci} + \beta_{16} \text{hum_sci} + \beta_{17} \text{mgt_econ} + \beta_{17} \text{fiscal_years} \\ & + \epsilon) \end{aligned}$$

IV. MODEL RESULTS

Three different models were utilized to analyze the retention and promotion performance of officers, as mentioned in the previous chapter. This chapter will present model results and interpret coefficients and their inferences. The models are significant, but the R-squares are relatively small. This is common in social science applied data work.

A. THE PROBIT MODEL

1. Retention

Table 19 presents results from the retention model. Probit regression is used to find the contributions of each independent variable to retention. Since chi-square is very close to zero, the overall model significantly explains the probability of retaining. Due to missing values, only 5,052 observations are used in the model. The dependent variable is “stay”, which equals “1” if an officer stayed until the O-4 promotion board, and “0” otherwise. Commissioning sources include USNA, NROTC-regular, NROTC-contract, OCS, and “other sources.” USNA is the base variable for those groups. The base group for gender is male. The “prior_enlisted” variable equals 1 for officers who have previous enlisted service experience, and 0 otherwise. Race is divided four groups; white, black, Asian, and other_race. White is the base category for race. Marital status is divided into the following groups: single and childless, single with children, married and childless, and married with children. Singles without children are the base group for the marital-status comparison. Educational background is coded to represent those officers with bachelor’s degrees and those with master’s. Officers with missing or unreported education levels were grouped under “no education level”, but none remained in the model because of missing values for other variables. Majors at college are hypothesized to be effective on retention, but not on promotion. This model includes five groups for majors: life and medical sciences, physical sciences, engineering majors, humanitarian sciences, management, and economic sciences. Engineering majors are used as the base category for discovering the effect of college majors on retention.

Table 19. Results for Retention and Promotion Models

	stay probit		promote probit	
	coefficient and sd	marginal effect	coefficient and sd	marginal effect
nrotc regular	0.2618 (0.0430)***	0.103 (0.0167)***	-0.0958 -0.0615	-0.0377 -0.0242
nrotc contract	0.4038 (0.1014)***	0.1537 (0.0361)***	0.5927 (0.1482)***	0.2103 (0.0449)***
ocs	0.614 (0.0668)***	0.2288 (0.0224)***	0.3967 (0.0932)***	0.1495 (0.0332)***
other_src	0.3404 (0.0652)***	0.1316 (0.0242)***	-0.1887 (0.0878)**	-0.0747 (0.0349)**
prior_enlisted	0.11 (0.0588)*	0.0435 (0.0231)*	0.1996 (0.0820)**	0.0771 (0.0310)**
female	-0.3134 (0.0625)***	-0.1245 (0.0245)***	-0.3213 (0.1003)***	-0.1275 (0.0397)***
black	-0.0776 -0.0651	-0.0309 -0.026	0.1403 -0.096	0.0543 -0.0366
asian	-0.1029 -0.0949	-0.041 -0.0379	0.0723 -0.1424	0.0282 -0.055
other_race	0.0879 -0.0784	0.0347 -0.0308	-0.0175 -0.1066	-0.0069 -0.0419
single_with_child	-0.1275 -0.1744	-0.0508 -0.0696	0.0533 -0.2501	0.0208 -0.097
married_no_child	0.01 -0.0414	0.004 -0.0164	0.1129 (0.0594)*	0.044 (0.0230)*
married_with_child	0.2059 (0.0599)***	0.0808 (0.0231)***	0.6629 (0.0856)***	0.2391 (0.0270)***
Post_Grad	0.0833 -0.1459	0.0329 -0.0573	-0.1219 -0.1991	-0.0482 -0.0793
life_medic_sci	0.043 -0.0771	0.017 -0.0305		
phy_sci	0.0431 -0.0555	0.0171 -0.022		
hum_sci	-0.0057 -0.0448	-0.0023 -0.0178		
mgt_econ	-0.069 -0.0625	-0.0274 -0.0249		
_lfiscal_ye_1995	0.0045 -0.0745	0.0018 -0.0296	-0.0623 -0.1041	-0.0245 -0.0411
_lfiscal_ye_1996	-0.0287 -0.076	-0.0114 -0.0302	0.1544 -0.1074	0.0597 -0.0408

_lfiscal_ye_1997	-0.0442 -0.0768	-0.0176 -0.0306	0.0518 -0.1087	0.0202 -0.0423
_lfiscal_ye_1998	0.0118 -0.0804	0.0047 -0.0319	0.0545 -0.1145	0.0213 -0.0445
_lfiscal_ye_1999	0.1288 -0.0789	0.0508 (0.0308)*	0.1722 -0.1082	0.0665 -0.0409
_lfiscal_ye_2000	0.1202 -0.0805	0.0474 -0.0315	0.4267 (0.1122)***	0.1588 (0.0387)***
_lfiscal_ye_2001	0.1814 (0.0834)**	0.0712 (0.0322)**	0.2281 (0.1130)**	0.0874 (0.0420)**
_lfiscal_ye_2002	-0.0797 -0.0889	-0.0317 -0.0354	0.4861 (0.1316)***	0.1778 (0.0434)***
_lfiscal_ye_2003	0.0177 -0.0929	0.007 -0.0368	0.3984 (0.1358)***	0.148 (0.0467)***
_lfiscal_ye_2004	-0.0553 -0.0881	-0.022 -0.0351	-0.1071 -0.1602	-0.0423 -0.0637
Constant	-0.1373 (0.0657)**		-0.1572 (0.0867)*	
Observations	5052	5052	2580	2580
Standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%				

All coefficients for each commissioning source are statistically significant at the 5% level and positive. This suggests that all commissioning sources have a higher retention than USNA. Examining the partial effects of commissioning sources, OCS is found to be the most effective source on retention. An OCS graduate is 22 percentage points more likely to stay until O-4 promotion board than an academy graduate. NROTC-contract, other sources, and NROTC-regular follow OCS by 15, 13, and 10 percentage points, respectively. Note that these differences are between effects of each source on retention as compared to USNA.

Having prior enlisted service is marginally significant at the 5% level. It increases the probability of staying to O-4 by 4%. Gender is also a significant variable on retention. Female officers are 12 percentage points less likely to stay in service than their male counterparts. Race variables are all insignificant, which means that race is not a contributing factor in retention, as compared to white officers. Moreover, using the Wald

test to analyze whether there is any difference among races other than comparing them to whites shows that there is no difference among races, either.

Single officers who do not have children are used as the base group for marital and dependency status. Only officers who are married and have children present a difference from the base category. These officers are 8% more likely to stay in the service than officers who are single without children. Having a master's degree is not significant in the model, which contradicts the hypothesis. Although it is not in the scope of this study, the underlying reason for this may be that officers who achieve a postgraduate degree will end up with a higher "reservation salary" and more opportunities in the civilian job market.

Probit regression results also provide the predicted overall retention probability for the average officer. According to these estimates, the average officer is predicted to stay in the service until O-4 at 54% probability. "Average" here implies USNA graduates, male, white, single, childless, graduates with a bachelor's in engineering, and without prior enlisted service.

2. Promotion

Promotion outcome is the dependent variable for the promotion probit model. It is a dichotomous variable that represents whether an officer is promoted at the O-4 promotion board. All other independent variables are the same as those used in the retention probit model. The only difference is that college majors are not included in the promotion model because they are hypothesized to be exogenous to promotion outcome.

Table 20 exhibits results for the promotion model, including the coefficients and marginal effects of each variable. Since chi-square is very close to zero, the overall model is robust. Due to missing values for variables, there remained 2,580 observations in the model.

Comparing the effect of commissioning sources on promotion as compared to USNA, all variables are statistically significant at the 5% level, except NROTC-regular, which is marginally significant at 10%. These results entail that commissioning sources

have different effects on promotion outcome compared to USNA. Keeping other variables constant in the model, graduates from NROTC-regular and other sources are less likely to promote to O-4 compared to USNA, by -4 and -7 percentage points, respectively. On the other hand NROTC-contract and OCS graduates are more likely to promote than USNA graduates by 21 and 15 percentage points, respectively. Since we are taking promotion as a performance measure, NROTC-contract graduates are the best performers in the model, followed by OCS, USNA, NROTC-regular, and “other sources.”

Having prior enlisted-service experience is significant and increases promotion probability by 7 percentage points. Gender is also significant at the 5% level. Female officers are 12 percentage points less likely to promote to O-4 than male officers. Many other studies have evidenced a gender gap. One cited reason is that females are more likely to leave because they are more likely to experience interrupted careers, mostly because of family responsibilities, and this decreases their chance to promote. As in the retention model, race is not significant in the promotion model, even at 10%, which implies that there is no correlation between getting promoted and race, holding other variables in the model constant. In addition, there is no difference between single officers in promotion, whether they have children or not. However, married officers are more likely to promote than single officers. Compared to single officers without children, this difference is 4 percentage points for married officers without children, and that variable is marginally significant at 5 percentage points. Married officers with children are most likely to promote by 24 percentage points difference in probability, compared to single officers without children, with 1% significance. Prior studies have observed this marriage premium (Bowman & Mehay, 1999). One hypothesis for this premium is that married employees tend to earn more and perform better than their single counterparts. One of the underlying reasons may be that married employees have a more stable and structured lifestyle, and that makes them more productive. Another reason may be that married people are more risk averse in work life and are more likely to secure their jobs. However, marriage may be endogenous to job performance, in that employees performing better in their “social life” are also performing better in their “work life”.

Holding a master's degree has no significant effect on promotion. As stated in the retention section, this may imply that officers with a master's degree have higher reservation salaries and have more job opportunities in civilian life.

B. HECKMAN SELF-SELECTION MODEL

Heckman's self-selection model is utilized to investigate robustness of probit models. We assume that there may be self-selection bias in the retention and promotion models. Officers who are unlikely to promote may leave before the O-4 promotion board. It is likely that officers promoted to O-4 were those who were eligible to stay and more satisfied with their military carrier. These would also be the officers who are more productive and successful in the Navy. In other words, the simple probit model for "promotion" excludes officers that left the service before the O-4 promotion board, causing the simple model to suffer from sample selection bias. To mitigate that bias from research results, the Heckman self-selection model adjusts the estimates of the promotion model to reflect the entire population, not just those who survived until the promotion point.

The Heckman model uses the same variables as in the probit models for retention and promotion. As in the probit retention model, college majors are hypothesized to be exogenous to promotion.

The Heckman model uses 4,921 officers, 2,341 of whom are censored observations (those who left earlier than the promotion board) and 2,580 of whom are uncensored observations (those who appeared before the promotion board). The Wald chi-square test shows the robustness of the model by having a probability of zero. In addition, the likelihood ratio test indicates that the errors from both models are significantly correlated. In other words, there is sample-selection bias in the simple probit "promotion" model.

Table 20 presents results for the Heckman regression. Among commissioning sources, NROTC-regular and "other sources" exhibit a significant difference from USNA in effect on promotion. NROTC-contract is marginally significant at 5% level. The OCS variable is not significant, which implies that OCS graduates do not have different

promotion probabilities than USNA graduates, keeping other variables constant. While NROTC-contract graduates are 5.7 percentage points more likely to promote than USNA graduates, NROTC-regular and “other sources” are less likely to receive promotion by 6.7 and 11 percentage points, respectively. In other words, NROTC-contract graduates are most likely to promote. USNA and OCS graduates have a higher probability of promotion than the other two groups of commissioning sources, NROTC-regular and “other sources.”

Table 20. Heckman Model Results for Retention and Promotion

	Heckman probit		
	promote		stay
	coefficient and sd	marginal effect	coefficient and sd
nrotc regular	-0.2175 (0.0475)***	-.0668 (.015)***	0.2812 (0.0436)***
nrotc contract	0.2069 (0.1237)*	.057 (.0312)*	0.3472 (0.1043)***
ocs	-0.0041 -0.0787	-.0012 .0235	0.6906 (0.0691)***
other_src	-0.34 (0.0684)***	-.1109 (.024)***	0.3525 (0.0652)***
prior_enlisted	0.0966 -0.0677	.028 .0191	0.0851 -0.0598
female	0.034 -0.0735	.01 .0214	-0.3115 (0.0643)***
black	0.1616 (0.0755)**	.0456 (.0201)**	-0.0748 -0.0656
asian	0.0975 -0.1078	.028 .0298	-0.0878 -0.0955
other_race	-0.0713 -0.0848	-.0217 .0264	0.1016 -0.0785
single_with_child	0.0922 -0.1959	.0265 .0543	-0.1223 -0.1747
married_no_child	0.0617 -0.0458	.0182 .0133	-0.0016 -0.0418
married_with_child	0.4149 (0.0727)***	.1084 (.0162)***	0.175 (0.0612)***
Post_Grad	-0.129 -0.1531	-.0402 .0498	0.0841 -0.1443
life_medic_sci			0.1892

			(0.0645)***
phy_sci			0.0764 -0.0468
hum_sci			0.0756 (0.0374)**
mgt_econ			-0.0521 -0.0523
_lfiscal_ye_1995	-0.0525 -0.0795	-.0159 .0244	0.0385 -0.0745
_lfiscal_ye_1996	0.118 -0.0827	.0339 .0228	-0.0019 -0.0761
_lfiscal_ye_1997	0.0519 -0.083	.0152 .0239	-0.0182 -0.0772
_lfiscal_ye_1998	0.0059 -0.0868	.0017 .0257	0.0167 -0.0803
_lfiscal_ye_1999	0.0283 -0.0848	.0083 .0248	0.1389 (0.0791)*
_lfiscal_ye_2000	0.2039 (0.0889)**	.0568 (.0230)**	0.1385 (0.0805)*
_lfiscal_ye_2001	0.0298 -0.0891	.0088 .026	0.1811 (0.0833)**
_lfiscal_ye_2002	0.3582 (0.1025)***	.0937 (.023)***	-0.0901 -0.0889
_lfiscal_ye_2003	0.2552 (0.1060)**	.0693 (.0259)**	-0.0059 -0.0935
_lfiscal_ye_2004	0.1699 -0.1168	.0476 .0306	-0.5192 (0.0984)***
Constant	0.6719 (0.0659)***	0.6719 (0.0659)***	-0.207 (0.0644)***
Observations	4921	4921	4921
rho Coef: sd:0.0233257 -0.9915393 Standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%			

Prior enlisted service and gender were two significant variables in the probit retention and promotion model. While prior enlisted experience has a positive contribution, being female has a negative contribution for both the probit promotion and retention models. After controlling for sample selection in the Heckman model, these two

characteristics become insignificant for promotion. It is concluded that while prior enlisted service experience and gender are effective in the decision to stay in the Navy, they are not a factor in promotion outcome.

Race was insignificant in both probit retention and promotion models. In the Heckman model, only “black” is significant at 5% level. According to the Heckman model, African-American officers are 4.6 percentage points more likely to promote than their white counterparts. Being Asian or belonging to other races does not present any significant difference from being white.

Marital and dependency status shows that only married officers with children are significantly different in promotion probabilities than childless singles. Their increase in probability of promotion is 10.8 percentage points.

Having a postgraduate degree is not significant in the Heckman model, confirming the first two models.

C. DOES THE SWO BONUS CHANGE THE TREND?

Although this study was not intended to draw inferences from dummy-year variables in the models, one thing that caught our attention was the increasing significance of year variables after year 2000. This was a sign that something not controlled-for explicitly was affecting retention and promotion outcomes. Especially in the promotion model, the years 2000 through 2003 suggested an increased promotion probability by up to 17 percentage points.

Assuming this may be the effect of the SWO bonus introduced in 2000, we ran a Chow test on pooled data. Officers were divided into two groups: before year 2000 and after 2000. Full-blown and modified Chow tests were utilized to see if there is structural change among retention and promotion outcomes over time. A dummy variable taking a value of “1” for year 2000 and above and “0” for years before 2000 was included. Interaction variables were created with that dummy and all other variables used in the

probit models. For the full-blown Chow test, both this dummy and interaction terms were used in the probit model, whereas for the modified Chow model, the dummy was excluded.

Table 21. Full-blown and Modified Chow Test Results

	stay probit		promotion probit	
	full blown chow	modified chow	full blown chow	modified chow
Ho	All interaction and time period dummy coefficients are zero	All interaction coefficients are zero	All interaction and time period dummy coefficients are zero	All interaction coefficients are zero
Chi2	28.04 (18)	27.19 (17)	28.37 (14)	6.72 (13)
Prob>Chi2	0.0615	0.0554	0.0127	0.9161
>Number of variables in test is in parentheses.				

Table 21 indicates that both the full-blown and modified Chow tests reject the probability of no change among retention outcomes between the two time periods for the retention model. This implies that the introduction of the SWO bonus significantly affected retention rates (at the 6% significance level).

On promotion models, the modified Chow test found no evidence to reject the null hypothesis, which indicates that there is no difference between the two time periods in the effect of the explanatory variables. However, the full-blown Chow test was significant almost at the 1% level. The difference between these two tests infers that even though interaction terms did not change over time, the slope of intercept for the two time periods changed. It can be inferred that although original variables did not change in nature after the year 2000, some other structural changes created an increase in the promotion outcome. This could be due to the SWO bonus introduced in year 2000. Furthermore, it is inferred that even though retention rates did not change after 2000, promotion rates increased. It may be concluded that although the same number of officers

stayed in the Navy until O-4, there was an increase in the number of officers promoting to O-4. The bonus may have made officers work harder to be eligible to promote.

D. SUMMARY

This chapter presents regression results for retention and promotion and investigates whether the SWO bonus, introduced in 2000, has any effect on retention and promotion trends. It utilizes basic probit models for retention and promotion. This chapter also describes the Heckman probit model, presuming there may be a selection bias for the promotion model. The Chow test is used to investigate structural change that may have happened after 2000, the year the SWO bonus was introduced.

Since there is a self-selection problem for the probit promotion model, Heckman model results are used instead of probit model results, as valid and robust results for promotion. Results show that graduates of all other commissioning sources are more likely to stay in the Navy until O-4 promotion than USNA graduates. OCS graduates have the highest probability of retention, followed by NROTC-contract, “other sources,” and NROTC-regular. When they stay in the Navy until O-4 promotion time, NROTC-contract graduates are most likely to promote, followed by USNA, OCS, NROTC-regular, and “other sources.”

The Chow test shows that the SWO bonus is most effective on retention but that it also boosted promotion rates among those who stayed.

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V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

This study analyzes the effect of commissioning programs on career progression for SWOs in the Navy. Retention and promotion were used as proxy measures to gauge officers' performance through their careers, and the results were used to compare the average performance of officers from each commissioning program. Three multivariate regression models were constructed to investigate the relationship between commissioning source and officer performance, using retention and promotion to O-4 as performance measures. One probit model was utilized to predict the retention model, since the expected outcome is dichotomous. The retention model uses the "stay" variable as a dependent variable. Another probit model was utilized to predict probability of promotion to O-4. The dependent variable was binary and labeled as "promote." Since there is a self-selection problem for the promotion model, the Heckman correction model was used to determine the effect of commissioning sources on promotion.

The data was acquired from Officer Master File via the Navy Econometric Modeling (NEM) online data system. It contained 10,295 observations. All observations were surface warfare officers who were before the promotion board between fiscal years 1994 through 2009. There was no promotion granted after 2004, which meant that these officers were still serving their O-3 obligations. Thus, these observations were dropped from data.

Due to missing values of variables, there remained 5,052 observations in the retention model. On average, officers are predicted to stay in the service until O-4, at 54% probability. The average officer in our data is one who is a USNA graduate, male, white, and single without children, with a bachelor's degree in engineering, and no prior enlisted service. Examining the partial effects of commissioning sources to find the magnitude of effect, OCS is the most effective source on retention. An OCS graduate is 22 percentage points more likely to stay until O-4 promotion board than a USNA graduate. NROTC-contract, "other sources," and NROTC-regular follow OCS by 15

percentage points, 13 percentage points, and 10 percentage points, respectively. Note that these differences are between the effects of each source on retention as compared to USNA.

In regard to the promotion data sample, due to missing values for variables, there remained 2,580 observations in the probit model. Comparing the effect of commissioning sources on promotion against that of USNA, all variables are statistically significant at the 5% level, except NROTC-regular, which is marginally significant at the 10% level. These results indicate that commissioning sources have different effects on promotion outcome compared to USNA. Keeping other variables constant in the model, graduates from NROTC-regular and other sources are less likely to promote to O-4, as compared to USNA, by -4 percentage points and -7 percentage points respectively. On the other hand, NROTC-contract and OCS graduates are more likely to promote than USNA graduates, by 21 percentage points and 15 percentage points respectively.

As for the Heckman correction model, this model used 4,921 officers, 2,341 of whom are censored observations (those who left earlier than promotion board) and 2,580 of whom are uncensored (those who appeared before promotion board). According to this model, among commissioning sources, NROTC-regular and “other sources” exhibit a significant difference from USNA on effect on promotion. NROTC-contract is marginally significant at the 5% level. The OCS variable is not significant, which implies that OCS graduates do not have different promotion probabilities than USNA graduates, keeping other variables constant. While NROTC-contract graduates are 5.7 percentage points more likely to promote than USNA graduates, NROTC-regular and “other sources” are less likely to receive promotion, by 6.7 percentage points and 11 percentage points, respectively. In other words, when staying in the Navy until O-4 promotion time, NROTC-contract graduates are most likely to promote, followed by USNA, OCS, NROTC-regular and “other sources.” Since there is a self-selection problem in the probit model, Heckman model results were considered as valid and robust.

B. CONCLUSIONS

The retention model was constructed to analyze the effect of commissioning sources on retention after the MSR. USNA being the base commissioning source in the model, all coefficients for each commissioning source are statistically significant at 5% level and positive. According to the results, OCS graduates are more likely to stay than officers commissioned from other sources. If they are ranked in terms of retention, NROTC-contract, “other sources,” NROTC-regular and USNA follow OCS. Having prior enlisted service is marginally significant and it increases the probability of staying to O-4. Most of the other explanatory variables were found to be statistically significant. The findings of demographic variables suggest that female, single, without-child officers are less likely to stay than male, married, with-child officers, respectively. Race variables are all insignificant, which means that race is not a contributing factor to retention. Among the independent variables that represent the professional and educational background of individuals, master's degrees or above were found to be insignificant, which contradicts our hypothesis. No college major presented any difference compared to engineering majors.

The Heckman promotion-model results indicate statistically significant effects of the commissioning source on promotion to O-4. According to the findings, officers commissioned through NROTC-contract have the highest probability of promotion. USNA and OCS graduates have a higher probability of promotion than the other two groups of commissioning sources, NROTC-regular and “other sources.” Namely, when remaining in the Navy until O-4 promotion time, NROTC-contract graduates are most likely to promote, followed by USNA, OCS, NROTC-regular, and “other sources.”

After controlling for sample selection in the Heckman model, prior enlisted service experience and gender become insignificant for promotion. We conclude that while these two characteristics are effective in the decision to stay in the Navy, they are not a factor in promotion. African-American officers are more likely to promote than their white counterparts. Being Asian or belonging to other races does not present any significant difference from being white. Marital and dependency status show that only married officers who have children are significantly different in promotion probabilities;

they are more likely to promote than those who are single and childless. Having a postgraduate degree is not significant in the Heckman model, like the first two models.

The analysis of all three multivariate regression models indicates that commissioning source is a significant determinant of retention and promotion for the SW community. Contrary to the initial assumption, while OCS graduates have the highest probability of staying in the SW community, USNA graduates have the lowest probability. Although USNA graduates were initially expected to have higher promotion rates, the results suggest that they are less likely to promote to the grade of O-4 than officers commissioned through NROTC-contract graduates. However, they have a higher probability of promotion than officers from OCS, NROTC-regular, and “other sources.”

C. RECOMMENDATIONS

Since this study only focused on the SWO community, generalization of the results for the whole Navy may not be a good approach. The initial assumptions were made according to prior studies on the Navy and this study’s results show that the effects of most retention and promotion determinants can change according to Navy community.

According to the findings of this thesis, for retention, OCS and NROTC-contract graduates seem to perform better than officers commissioned through other programs. As for promotion, NROTC-contract and USNA graduates perform better than the other sources. Hence, the Navy may consider increasing the mix of officers commissioned through NROTC-contract, USNA, and OCS for the SW community. On the other hand, since the cost of producing one additional officer also plays a key role in determining the mix of officers, a cost-effectiveness analysis should be performed as a comparison factor to fully analyze the optimal officer mix. Additionally, since officer quality is crucial and USNA provides a more comprehensive and quality education, this issue should also be considered.

Due to the lack of required data elements, some variables such as “fitness reports,” “officer-evaluation reports,” “performance at schools,” “graduate GPA,” and “deployment info” could not be included as explanatory variables in this study. In future research, controlling for these variables may improve the robustness of the results.

Further studies may investigate the effects of commissioning sources on promotion to O-5 to check whether these results remain the same. Moreover, studies may be conducted to analyze other communities of the Navy, as to whether these communities differ in terms of retention and promotion.

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